

**MIDTERM REVIEW AND UPDATE ON THE COR-
PORATE AVERAGE FUEL ECONOMY PROGRAM
AND GREENHOUSE GAS EMISSIONS STANDARDS
FOR MOTOR VEHICLES**

JOINT HEARING

BEFORE THE
SUBCOMMITTEE ON COMMERCE, MANUFACTURING,
AND TRADE

AND THE
SUBCOMMITTEE ON ENERGY AND POWER
OF THE

COMMITTEE ON ENERGY AND
COMMERCE

HOUSE OF REPRESENTATIVES

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² Dr. Cooper did not answer submitted questions for the record by the time of printing.

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MIDTERM REVIEW AND UPDATE ON THE CORPORATE AVERAGE FUEL ECONOMY PROGRAM AND GREENHOUSE GAS EMIS- SIONS STANDARDS FOR MOTOR VEHICLES

THURSDAY, SEPTEMBER 22, 2016

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON COMMERCE, MANUFACTURING, AND
TRADE,
JOINT WITH THE
SUBCOMMITTEE ON ENERGY AND POWER,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittees met, pursuant to call, at 10:06 a.m. in Room 210 of the Capitol Visitor Center, Hon. Michael Burgess (chairman of the Subcommittee on Commerce, Manufacturing, and Trade) presiding.

Members present: Representatives Burgess, Barton, Shimkus, Blackburn, Latta, Harper, Lance, Guthrie, Olson, McKinley, Griffith, Bilirakis, Johnson, Long, Flores, Brooks, Mullin, Hudson, Upton (ex officio), Engel, Green, Schakowsky, Castor, Sarbanes, McNerney, Welch, Tonko, Yarmuth, Loebsack, Kennedy, and Pallone (ex officio).

Staff present: Gary Andres, Staff Director; Grace Appelbe, Staff Assistant; Will Batson, Legislative Clerk, Energy and Power; Elena Brennan, Staff Assistant; James Decker, Policy Coordinator, Commerce, Manufacturing, and Trade; Graham Dufault, Counsel, Commerce, Manufacturing, and Trade; Blair Ellis, Digital Coordinator/Press Secretary; Melissa Froelich, Counsel, Commerce, Manufacturing, and Trade; Giulia Giannangeli, Legislative Clerk, Commerce, Manufacturing, and Trade, and Environment and the Economy; Tom Hassenboehler, Chief Counsel, Energy and Power; A.T. Johnston, Senior Policy Advisor; Ben Lieberman, Counsel, Energy and Power; Brandon Mooney, Professional Staff Member, Energy and Power; Paul Nagle, Chief Counsel, Commerce, Manufacturing, and Trade; Annelise Rickert, Legislative Associate; Chris Sarley, Policy Coordinator, Environment and the Economy; Dan Schneider, Press Secretary; Olivia Trusty, Professional Staff Member, Commerce, Manufacturing, and Trade; Michelle Ash, Democratic Chief Counsel, Commerce, Manufacturing, and Trade; Jeff Carroll, Democratic Staff Director; Timia Crisp, Democratic AAAS Fellow; Jean Fruci, Democratic Energy and Environment Policy Advisor.

Mr. BURGESS. The Subcommittee on Commerce, Manufacturing, and Trade will now come to order. I will recognize myself 5 minutes for the purpose of an opening statement.

**OPENING STATEMENT OF HON. MICHAEL C. BURGESS, A
REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS**

Congress established the Corporate Average Fuel Economy Program in 1975 to improve vehicle fuel economy, to reduce oil consumption, and to secure the Nation's energy independence. The National Highway Traffic Safety Administration was tasked with overseeing the program and empowered to set fuel economy standards for cars and trucks sold in the United States.

Since the establishment of the Corporate Average Fuel Economy Program, it has undergone significant modifications and revision. Some changes were driven by fluctuating economic conditions and projected marketplace activity. Advancements in automotive technology have also played a part, and still other changes have been driven by political winds.

Layer on top of that the National Highway Traffic Safety Administration and the Environmental Protection Agency and all the States setting up their own programs, and you have one very complicated regulatory scheme. As we gather today to discuss CAFE greenhouse gas emissions and the midterm review, I want to admit that I have serious concerns about the real-world impact that the National Highway Traffic Safety Administration's standards for model year 2022 to 2025, that are the standards that they will have on vehicles on our economy. I worry about the health of the auto industry and of course consumer welfare.

I believe in fuel efficiency, I believe in energy independence, but I also believe in policy that is based upon the real world, and I really believe in consumer choice and consumer wisdom. In Texas we have big spaces and we like to get around those big spaces in big cars with big air conditioners, and technology and gas prices have allowed us to do that with a great degree of facility.

I also believe strongly in the power of efficiency. Every summer I hold an Energy Efficiency Summit in the district when historically fuel and electricity prices are at their highest in a State like Texas, where temperatures exceed 100 degrees consistently through the summer.

However, as strongly as I feel about energy efficiency, I feel equally as strongly that the Government should not be in the business of telling consumers what they can use and what they cannot purchase. The issue of a product's efficiency, whether it be a lightbulb or motor vehicle, should be between the manufacturer, the company that manufactures, and the consumer.

For this reason I have introduced H.R. 4504, the Energy Efficiency Free Market Act, to repeal the Department of Energy's authority to mandate efficiency standards for all consumer products. That is not to say that I don't believe in purchasing the most efficient products available. I drive a hybrid, a strong hybrid, in the vernacular of today's witnesses. When I built my house I made certain the products we used were the most energy efficient we could obtain in off-the-shelf items.

But those were my choices. The Government wasn't and shouldn't be part of those decisions. What I don't want to see is the Government regulations and overly prescriptive mandates taking away consumer choice and putting the big hurt on the family budget.

The auto industry is one of the few bright spots in our economy. It creates millions of jobs. It drives productivity. It drives innovation. It drives economic growth. It also allows for investments into lifesaving technologies that make our roadways safer and more secure for the driving public.

I am deeply concerned that the planned fuel economy standards for future model years will significantly stall that progress and dramatically reduce consumer choice. I am concerned that in some cases it could even push consumers into less safe cars because they either have to buy a used car or because they can't afford the newest CAFE technology, and subsequently they do not avail themselves of the newest safety technologies.

At a time of persistent economic uncertainty facing hardworking American families, we have a responsibility to ensure that this does not happen. In that vein, I look forward to discussing the assumptions of both the Highway National Traffic Safety Administration and the Environmental Protection Agency and how they are looking at these assumptions as they require ever-increasing fuel efficiency standards and how they further the National Highway Traffic Safety Administration's core mission in providing safe and secure vehicular travel for the American people.

[The opening statement of Mr. Burgess follows:]

PREPARED STATEMENT OF HON. MICHAEL C. BURGESS

Congress established the Corporate Average Fuel Economy program in 1975 to improve vehicle fuel economy, reduce oil consumption, and secure the Nation's energy independence. The National Highway Traffic Safety Administration was tasked with overseeing the program and empowered to set fuel economy standards for cars and trucks sold in the United States.

Since the establishment of CAFE, the program has undergone significant modifications and revisions. Some changes were driven by fluctuating economic conditions and projected marketplace activity. Advancements in automotive technology have also played a part. And still other changes have been driven by political winds. Layer on top of that NHTSA, EPA and the States all setting up their own programs and you have one very complicated regulatory scheme.

As we gather today to discuss CAFE, greenhouse gas emissions, and the Midterm Review, I have serious concerns about the real-world impact that NHTSA's augural standards for model year 2022 to 2025 vehicles will have on the economy, the health of the auto industry, and consumer welfare.

I believe in fuel efficiency, and energy independence. But I also believe in policy that is based on real world data, and consumer choice. In Texas, we have big spaces and we like to get around those big spaces in our big cars. And technology and gas prices let us do that pretty easily.

I believe so strongly in the power of efficiency, in fact, that I hold an annual Energy Efficiency Summit in my district every July, when historically fuel and electricity prices skyrocket in a State like Texas, where temperatures exceed 100 degrees consistently through the summer.

However, as strongly as I feel about energy efficiency, I feel equally as strongly that Government should not be in the business of telling consumers what they can and cannot purchase. The issue of a product's efficiency, whether it be a lightbulb or a motor vehicle, should be solely between the company and the customer. For this reason, I introduced H.R. 4504, the Energy Efficiency Free Market Act, to repeal the Department of Energy's authority to mandate efficiency standards of consumer products.

This is not to say I don't believe in purchasing the most efficient products possible. I drive a hybrid. When I built my house, I made sure the products we used were the most efficient we could obtain. But those were my choices. The Government wasn't and shouldn't have been part of those decisions.

What I don't want to see is Government regulations and overly prescriptive mandates taking away consumer choice and putting a real hurt on the family budget.

The auto industry is one of the few bright spots of our economy. It creates millions of jobs and drives productivity, innovation, and economic growth. It also allows for investments into lifesaving technologies that make our roadways safer and more secure for the driving public.

I am deeply concerned that the planned fuel economy standards for future model years will significantly stall that progress and dramatically reduce consumer choice. I am concerned that in some cases it could even push consumers into less safe cars, either because they have to buy used or because they can't afford the newest CAFE technology and the newest safety technologies.

At a time of persistent economic uncertainty facing hardworking American families, we have a responsibility to ensure that does not happen. In that vein, I look forward to discussing the assumptions that NHTSA and EPA are looking at as they require ever increasing fuel efficiency standards and how they further NHTSA's core mission in providing safe and secure vehicular travel for the American people.

Mr. BURGESS. That concludes my opening statement. I will yield back my time and recognize the ranking member of the Subcommittee on Commerce, Manufacturing, and Trade, Ms. Schakowsky, 5 minutes for an opening statement, please.

OPENING STATEMENT OF HON. JANICE D. SCHAKOWSKY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Ms. SCHAKOWSKY. Thank you, Chairman Burgess. I am pleased to join you and my colleagues for this joint hearing of the Commerce, Manufacturing, and Trade and Energy and Power subcommittees.

Over the past four decades, Corporate Average Fuel Economy, or CAFE, standards have been an important tool in improving fuel efficiency and reducing greenhouse gas emissions. Think about how much cars have changed in that time. They became lighter and more aerodynamic. Engines have gotten more efficient. And we have seen the emergence of hybrid, which I have, electric and alternative fuel vehicles.

These technological advancements were driven, in part, by CAFE standards. CAFE standards were borne out of the energy crisis in the 1970s. We now face a different and larger crisis, the threat of global climate change. I am not here to debate science. The argument is settled. We need to think about how CAFE factors into our broader efforts to improve fuel economy and decrease carbon emissions that contribute to global climate change.

The work of the National Highway Transportation Safety Administration and Environmental Protection Agency to set fuel efficiency and greenhouse gas emission standards is critical. I have heard the arguments that CAFE standards are ambitious, push the line limit of technology; that is a good thing. We must take meaningful steps to reduce fuel consumption, and strong standards push the auto industry toward greater efficiency and innovation.

Today we examine CAFE standards as NHTSA and the EPA work to finalize their Technical Assessment Report, TAR, a step in evaluating standards for model years 2022 through 2025. Discussion of the TAR and the midterm review may seem technical but

the purpose is simple, to determine what standards are feasible going forward. I want us to be ambitious but practical as we consider these standards. Those of us serving on these subcommittees have responsibility to reject hollow arguments put forth to justify lower targets.

I want to clarify a few items from the start. NHTSA and EPA do not set a single fuel economy standard. Since 2007, the standards for each automaker have been customized to a vehicle's wheelbase and track width, the vehicle's footprint. That means that standards are already tailored to an automaker's unique fleet.

Since 2008, vehicles have gotten bigger, meaning lower standards apply. We need to think carefully before providing further needless flexibility that allows for even lower fuel efficiency than an automaker would otherwise need to achieve.

On that note, I approach discussion of credits for meeting CAFE standards with what I think is a healthy level of skepticism. Should an eco-friendly sedan excuse a gas-guzzling SUV? That seems hard to justify when other automakers have manufactured an efficient SUV but a less efficient car. We should expect progress across all classes of vehicles. I find the proposal of credits for safety improvements especially disingenuous, and I see that suggestion again in some of the written testimony today.

As ranking member of the Commerce, Manufacturing, and Trade Subcommittee, I am a strong advocate for auto safety. This is one of the key consumer protection issues we work on. Safety and fuel efficiency should not be presented as an either/or scenario. The automakers should not get a pass on fuel economy for making safety improvements that they have already committed to making.

The argument for safety credits on a shaky premise that safety technologies lead to lower energy consumption by reducing congestion. The data shows otherwise. According to the Department of Transportation, more than 75 percent of congestion is caused by bottlenecks, construction zone, bad weather, poor traffic signal timing, and special events, not crashes.

Contrary to some of the arguments we will hear today, safety technology will not help with this congestion, and will not increase congestion and will not improve fuel economy. Improving fuel economy is vital. I look forward to hearing from our witnesses on what standards are feasible to achieve this and how we can continue using CAFE standards to drive the automotive industry forward. And I yield back.

Mr. BURGESS. The gentlelady yields back. The Chair thanks the gentlelady. The Chair now would like to recognize the chairman of the Subcommittee on Energy and Power, Mr. Olson, 5 minutes for an opening statement, please.

**OPENING STATEMENT OF HON. PETE OLSON, A
REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS**

Mr. OLSON. I thank my friend from Texas for taking the lead in making this important joint hearing happen. This midterm review of Federal CAFE standards and GHG emissions is exactly what the American people expect from their Congress. It is timely, because when this process began our world and our economy were very different.

Gasoline prices were only going up from record highs and interest rates were closer to ten percent instead of one percent today. Now America is deemed number one producer of oil and gas in the entire world which has lowered gasoline prices significantly. The Federal Reserve does not budge in increasing interest rates. As a result, certain assumptions have changed.

This is mostly good news for consumers, but it changes their spending habits, their patterns. With this stagnant economy consumers are looking for the best value when buying new cars and looking long term, 5 to 10 years of ownership on average. The new technology automakers are developing to meet the CAFE and GHG standards cost more. Today we will look at how consumer choices impact the ability to meet these goals.

The One National Program so far has been a good example of cooperation between the public and private sectors. In these situations, the public sector must speak with only one clear voice. When two agencies have conflicts no one wins. I worked hard to protect our Nation's electric grid by fixing a small glitch in Federal law that forced electricity producers to choose which Federal law they would violate due to competing and conflicting Federal agencies.

The One National Program was designed to avoid this situation for automakers. This midterm evaluation is the best occasion to ensure that three different sets of rules do not conflict with one another. In reviewing the requirements of each program, there is a clear gap that can leave manufacturers in compliance with one set of rules and out of compliance with another set of rules. And that is just based on NHTSA and EPA's regs. It does not include the zero-emission vehicle program being developed by California.

I also want to hear from the EPA about the benefits of the rulemakings. This is a very complex and expensive set of rules and we need to start with a very strong foundation. This midterm evaluation is a starting point where we can work together to avoid conflicts before they become a big problem.

And it is not just automakers that suffer if we don't get this right. The American people will greatly be impacted by a patchwork system that increases costs while weakening the most important force for growth in a free-market economy, consumer choice. I hope that working together we can find a common ground to harmonize these standards and develop the real vision of the One National Program.

Thank you, Mr. Chairman. I yield back.

[The opening statement of Mr. Olson follows:]

PREPARED STATEMENT OF HON. PETE OLSON

This Midterm Review of the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards is timely. When this process began, America was in a different world than we are today. Back then, gas prices were at a record high and assumed to go higher.

Today America is the number one producer of oil and natural gas, which has lowered gas prices significantly. As a result, certain assumptions have changed considerably.

While this is good news for consumers, it also changes their priorities. A stagnant economy and low gas prices have consumers looking for the best value when buying a car. The new technology auto makers are developing to meet the CAFE and GHG standards cost more. Today, we will look at how consumer choices impact the ability to meet these goals.

Another important issue this committee has looked at closely is the ability of industries to meet goals set by Federal agencies. When two agencies have conflicting priorities, no one wins. I worked hard to protect our Nation's electric grid reliability by helping fix a critical glitch in Federal law that forced electricity producers to choose which Federal law they would violate due to competing priorities.

The One National Program was designed to avoid a similar situation for auto makers. This Midterm Evaluation is the best occasion to ensure that three different sets of rules do not conflict with one another. In reviewing the requirements of each program, there is a clear gap that can leave manufacturers in compliance with one set of rules and not another.

And that is just based on NHTSA and EPA's regs—it does not include the Zero Emission Vehicle program being developed by California.

I am also interested to hear from EPA about the benefits of their rulemakings. This is a complex and expensive set of rules, and we need to start with a strong foundation.

This Midterm Evaluation is a starting point where we can work together to avoid a similar situation to the one electricity producers faced—BEFORE it becomes a problem. It's not just auto makers who suffer if we don't get this right. The American people will be greatly impacted by a patchwork system that increases costs, when it could have been avoided.

I hope that working together, we can find the common ground to harmonize these standards and develop the real vision of One National Program.

Mr. BURGESS. The Chair asks if you would be willing to yield Mrs. Blackburn the remainder of your time.

Mr. OLSON. Absolutely. You have my time, the gentlelady from Tennessee, Mrs. Blackburn.

Mrs. BLACKBURN. Thank you, Mr. Chairman. I want to welcome all of our witnesses because it is so appropriate that we do take the time to go over the CAFE standards and to remember why these came about, and we have talked a little bit about that this morning. The '70s were a very different time, and there was a lot of emphasis on our vulnerabilities. You had the gas shortages of the '70s that brought that about. People paid attention to that. This past weekend we had gas shortages in Tennessee and people recalled those gas lines of the '70s.

But CAFE came out of that, and it was set up to reduce our dependence on foreign oil, a worthy goal. But what we have to do is realize that we have these differences between EPA and NHTSA and we do need to move to harmonization for these standards in order for them to be effective.

I have got a big presence of auto industry in my district. We have Nissan. We have GM. We have the Toyota Bodine plant. And everyone talks about the dilemma that this presents and the need to make certain that you are in compliance with each of these. One stop makes it easier, because on top of that then you have things like the California CARB program that you are also dealing with. Safety, security is important to us in these vehicles as well as looking at the environmental issues. We welcome you, look forward to the discussion. Yield back.

Mr. BURGESS. The gentlelady yields back. The gentleman's time has expired. The Chair now recognizes the gentleman from California, Mr. McNerney, 5 minutes for an opening statement, please.

OPENING STATEMENT OF HON. JERRY MCNERNEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. MCNERNEY. Well, I thank the chairman. I thank the witnesses for coming out here this morning. I am looking forward to

your testimony. It is great to have this joint hearing today to receive an update from the agencies and industry stakeholders regarding the CAFE standards. It is an important subject and one in which I have a great deal of interest, both because it relates to our overall consumption of fossil fuels and our dependence on imported oil and because it has a significant impact on climate change.

To date, the automotive industry and Government have worked together to reduce emissions and create safer and more efficient vehicles. This is a win-win for consumers and the environment, and I own a Camry hybrid so I personally know the benefits of these vehicles.

CAFE standards have proven moderately effective, but there are factors beyond CAFE that are impacting the marketplace, the brokered agreement on greenhouse gas emissions, the lowering cost of gasoline, consumer preferences, and improving fuel efficiency of automobiles, and State emissions initiatives such as the Zero Emission Vehicle program in California that requires automakers to sell electric cars and trucks in California.

California's EV penetration is about three percent compared to the national average of one percent. And Californians have 22 different types of EVs to choose from. The market is there and California has shown that it can work. California has been a leader in programs that reduce emissions for both stationary and mobile sources.

Mobile sources account for more than half of the emissions that contribute to ozone and particulate matter and nearly 40 percent of the greenhouse gas emissions in our State. As a result of the improving technology and consumer choice, Californians continue to purchase zero-emission vehicles.

Some regions of our State, including my own, will greatly benefit from the reduced emissions of low carbon vehicles, and EVs will have a significant impact on the Nation's electric grid. California's electric grid utilities recognize the importance of EVs to the 21st century grid infrastructure and are making the appropriate investments. This will help lead and transform the rest of the Nation.

Now regions do differ in energy use patterns. However, reducing emissions is a national goal and increasing zero or low emission vehicles is good for our Nation. California is the leader in hybrid zero-emission vehicles and its EV program technology innovation is paramount. It leads to efficiency and it can lower costs for consumers and manufacturers and it is good for investment. We have in California by 2010 over \$800 million was invested in EV research and development. That was nearly three-quarters of the global investment at that time, so our policies are having an impact.

We cannot discuss zero-emission vehicles without talking about their impact on the electric grid. EVs will play a tremendous role in the future of our grid from utility through end user. EVs play a role in storage and allow users to feed back to the grid or use stored power outside. These are things that the elements of a transforming grid and our Nation's future of distribution of energy.

Thank you, Mr. Chairman. I yield back.

Mr. BURGESS. The Chair thanks the gentleman. The gentleman yields back. The Chair recognizes the chairman of the full committee, Mr. Upton, 5 minutes for an opening statement, please.

OPENING STATEMENT OF HON. FRED UPTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Mr. UPTON. Well, thank you, Mr. Chairman. You know, you don't have to come from Michigan to be concerned about the administration's motor vehicle fuel economy and greenhouse gas emission standards, because these provisions if they are done wrong would hurt car owners as well as car makers, big time.

The good news is that the 2012 standards wisely included a do-over provision in the form of a midterm evaluation that does allow the EPA and NHTSA to adjust the future stringency of the standards in light of changed circumstances. And as I recall that was a revision that Carl Levin and John Dingell and myself worked very hard to include as part of those provisions so that we would have this opportunity, bipartisan.

And circumstances certainly have changed. In particular, EPA and NHTSA assumed that gas prices would be headed towards 4 and maybe even \$5 a gallon by now, but instead they are actually somewhat stable at \$2 a gallon at the moment. And at these prices, the added cost of hybrids or other highly efficient vehicles may never be earned back in the form of energy savings, and the sticker shock is far from trivial. EPA estimates a cumulative impact on vehicle prices of nearly \$3,000 per vehicle by 2025, and some analysts believe that the actual cost is considerably higher.

No question that improved vehicle fuel efficiency is a worthy goal, no question about it, but not if it reached in a way that harms consumers particularly the most vulnerable. And with the average cost of a new car at \$34,000 and rising, we don't need any unnecessarily costly DC mandates, and we have got to be particularly sensitive to low-income households who may be getting priced out of the new car market altogether.

So for Michigan I also worry about the impact that these standards could have on the long-term health of the auto sector. The industry is doing pretty well right now, thanks in large part to pent-up demand after the last recession and very low interest rates that make financing about as cheap as it has ever been. But these two temporary factors are not always going to last, and the industry will be stuck with these costly standards that perhaps will increase every single year.

That is why I hope that EPA and NHTSA use this opportunity to adjust the targets for model years 2022 to 2025 to more reasonable and achievable levels. There are also more immediate problems that have to be addressed. This administration promised the auto industry one set of uniform national standards rather than a patchwork of inconsistent requirements. Several years into the program, it is clear that the two Federal agencies involved, EPA and NHTSA, are not always on the same page.

So we need to make some changes including legislation if necessary to ensure that there is one set of rules for automakers to follow. Motor vehicles are getting more efficient and they are going to continue to do so, and that is a good thing. But we need to make

certain that it happens in a way that maximize benefits for consumers and preserves the health of the automotive industry.

But I know that today's hearing is going to help set us on that course, and I yield back. Thank you, Mr. Chairman.

[The opening statement of Mr. Upton follows:]

PREPARED STATEMENT OF HON. FRED UPTON

You don't have to come from Michigan to be concerned about the Obama administration's motor vehicle fuel economy and greenhouse gas emission standards, because these provisions, if done wrong, would hurt car owners as well as car makers.

The good news is that these 2012 standards wisely included a "do-over" provision in the form of a Mid-Term Evaluation that allows EPA and NHTSA to adjust the future stringency of the standards in light of changed circumstances.

And circumstances certainly have changed. In particular, EPA and NHTSA assumed that gasoline prices would be headed toward \$4.00 a gallon by now, but instead they have continued to trend toward \$2 a gallon. At these prices, the added cost of hybrids or other highly efficient vehicles may never be earned back in the form of energy savings. And the sticker shock is far from trivial—EPA estimates a cumulative impact on vehicle prices of nearly \$3,000 per vehicle by 2025 and some analysts believe the actual cost is considerably higher.

There is no question that improved vehicle fuel efficiency is a worthy goal, but not if it is reached in a way that harms consumers. With the average cost of a new car at \$34,000 and rising, we don't need any unnecessarily costly Washington mandates. And we must be particularly sensitive to low income households who may be getting priced out of the new car market entirely.

Being from Michigan, I also worry about the impact these standards could have on the long-term health of the auto sector. The industry is doing well now, thanks in large part to pent-up demand after the last recession and very low interest rates that make financing about as cheap as it has ever been. But these two temporary factors will not last, and the industry will be stuck with these costly standards that increase every year. That is why I hope EPA and NHTSA use this opportunity to adjust the targets for model years 2022 to 2025 to more reasonable and achievable levels.

There are also more immediate problems that need to be addressed. The Obama administration promised the auto industry one set of uniform national standards rather than a patchwork of inconsistent requirements. But several years into the program, it is clear that the two Federal agencies involved, EPA and NHTSA, are not always on the same page. We need to make changes, including legislation if necessary, to ensure that there is one set of rules for automakers to follow.

Motor vehicles are getting more efficient and will continue to do so, but we need to make certain that it happens in a way that maximizes benefits for consumers and preserves the health of the automotive industry. I hope today's hearing helps set us on that course.

Mr. BURGESS. The Chair thanks the gentleman. The gentleman yields back. The Chair recognizes the ranking member of the full committee, Mr. Pallone of New Jersey, 5 minutes for an opening statement, please.

OPENING STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. Thank you, Mr. Chairman. I am not saying this about Mr. Upton or the Michigan members, but I think that unlike the symbol of the Republican Party, the elephant, which has a long memory, many of my GOP colleagues have very short memories. Because I remember when the President was out there, you know, really trying to play up the need for a bailout for the auto industry and there were many Republicans including those in the leadership who didn't want to do it.

So it is very nice for everybody to say that, you know, they want to help the auto industry, but that certainly wasn't the case.

Mr. UPTON. If the gentleman will yield momentarily.

Mr. PALLONE. It is not true for you, Mr. Chairman. I am not suggesting that for you.

Mr. UPTON. We like to use the word "rescue plan" versus "bail-out" because it was paid back. It was paid back.

Mr. Pallone. Oh, rescue plan, OK. And anyway, I like elephants, but many of you don't live up to the elephant. But in any case, not true for you.

Thank you for holding this hearing on the midterm review of the Federal greenhouse gas and fuel economy standards for light-duty vehicles. It has been some time since our committee held a hearing to examine the Corporate Average Fuel Economy, or CAFE, program. We have an excellent panel of witnesses here today. I particularly want to thank Assistant Administrator McCabe and Chief Counsel Hemmersbaugh for appearing before us today.

There is no scientific doubt that the climate is indeed changing and we need to be more aggressive about controlling greenhouse gas emissions. Today the transportation sector is second only to the electricity sector in the production of greenhouse gas emissions. The vehicles regulated under the CAFE program account for 60 percent of the total emissions from the transportation sector, and these harmful emissions effect more than our climate. They also directly impact air quality and public health.

The coordinated standards for greenhouse gas emissions set by the EPA and fuel economy set by NHTSA are a vital part of the effort to control harmful emissions. These standards will deliver multiple benefits including significant savings in fuel costs to consumers, improved air quality, and greater energy security. Compliance with these Federal standards will also ensure that automakers are in compliance with the greenhouse gas emission standards issued by California.

Gasoline prices have come down. That is great. Lower fuel prices keeps more money in people's pockets. But we also know from past experience that prices can rise quickly, and when they do improved fuel economy provides an effective buffer from price spikes.

In 2007, there were two major events that changed the regulatory landscape for vehicles. First, the Supreme Court ruled in *Massachusetts v. EPA* that the Clean Air Act required EPA to regulate greenhouse gas emissions. Second, Congress amended the Energy Policy and Conservation Act to provide automakers a more flexible regulatory program.

The targets set by EPA and NHTSA are aggressive. The purpose of the midterm review is to answer two key questions. Can automakers meet the standards and can they meet them at a reasonable cost? And the extensive analysis presented in the Technical Assessment Report done by EPA, NHTSA, and California Air Resources Board indicates the answer to both of these questions is yes.

Innovation is and always has been the driver for these advancements. We recognized that air pollution from auto emissions was a serious problem in Southern California as early as 1959, and at that time there were no pollution control devices for cars. Auto

manufacturers said pollutants could not be controlled; that the technology didn't exist; and they claimed that even if it were possible it would be far too expensive to deploy the technology.

Well, California passed laws requiring pollution control anyway. We all know the rest of the story. It was not impossible. It was not too expensive. We enacted the Clean Air Act and fuel efficiency standards, and of course people still bought cars. Not only did they buy cars, but today we have cleaner, more efficient cars than ever, and we also have much cleaner air thanks to regulation pushing technology forward.

So the last phase of the coordinated regulations maintain the necessary pressure for further improvement, and I have no doubt that our auto industry can and will rise to the occasion. I would like to yield the remainder of my time to Mr. Tonko.

[The opening statement of Mr. Pallone follows:]

PREPARED STATEMENT OF HON. FRANK PALLONE, JR.

Good morning. Thank you for holding this hearing on the mid-term review of the Federal greenhouse gas and fuel economy standards for light duty vehicles. It has been some time since our committee held a hearing to examine the Corporate Average Fuel Economy—or CAFE Program. We have excellent panels of witnesses here today and I particularly want to thank Assistant Administrator McCabe and Chief Counsel Hemmersbaugh for appearing before us today.

There is no scientific doubt that the climate is indeed changing, and we need to be more aggressive about controlling greenhouse gas emissions. Today, the transportation sector is second only to the electricity sector in the production of greenhouse gas emissions.

The vehicles regulated under the CAFE program account for 60 percent of the total emissions from the transportation sector. And, these harmful emissions affect more than our climate, they also directly impact air quality and public health.

The coordinated standards for greenhouse gas emissions set by the Environmental Protection Agency (EPA) and fuel economy set by the National Highway and Traffic Safety Administration (NHTSA) are a vital part of the effort to control harmful emissions. These standards will deliver multiple benefits including: significant savings in fuel costs to consumers; improved air quality; and greater energy security. Compliance with these Federal standards will also ensure that automakers are in compliance with the greenhouse gas emission standards issued by California.

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The targets set by EPA and NHTSA are aggressive. The purpose of the midterm review is to answer two key questions: Can automakers meet the standards? And, can they meet them at a reasonable cost? The extensive analysis presented in the Technical Assessment Report—or TAR—done by EPA, NHTSA, and California's Air Resources Board indicates the answer to both of these questions is "yes."

Innovation is and always has been the driver for these advancements. We recognized that air pollution from automobile emissions was a serious problem in southern California as early as 1959. At that time, there were no pollution control devices for cars. Auto manufacturers said pollutants couldn't be controlled—the technology didn't exist. And, they claimed that even if it were possible, it would be far too expensive to deploy the technology.

Well, California passed laws requiring pollution control anyway. We all know the rest of the story. It was not impossible. It was not too expensive. We enacted the Clean Air Act and fuel efficiency standards and, of course, people still bought cars. Not only did they buy cars, but today we have cleaner, more efficient cars than ever. We also have much cleaner air thanks to regulation pushing technology forward.

The last phase of the coordinated regulations maintain the necessary pressure for further improvement, and I have no doubt that our auto industry can and will rise to the occasion.

Mr. TONKO. I thank the gentleman for yielding. Let's be clear. These standards protect consumers and reduce greenhouse gas emissions. This year, transportation surpassed the electricity sector as the largest source of greenhouse gas emissions in our country.

Throughout her history America has engaged a pioneer spirit. That pioneer spirit was about meeting challenges. CAFE standards meet challenges and are an important aspect to reaching our emissions goals, and by so doing we are also saving consumers a lot of money at the pump. Consumers support more fuel efficient cars regardless of their feelings on climate change. I think that is important to note.

And I would certainly offer caution to those who would seek to roll back standards because of today's gas prices. Even though gas prices may have been reduced, they won't stay that way forever and it is important for us to go forward with our stewardship of the environment to pass on to the next generation and even improved environment. With that I yield back.

Mr. BURGESS. The gentleman yields back. The gentleman's time has expired. That concludes Member opening statements. I do want to remind Members that, pursuant to committee rules, all Members' opening statements will be made part of the record.

We do want to thank our witnesses for being here today, for taking the time to testify before the subcommittee. Today's hearing will consist of two panels. Each panel of witnesses will have the opportunity to give an opening statement followed by a round of questions from members. Once we conclude with the questions of the first panel, we will take a very brief, underscore brief, recess to set up for the second panel.

Our first panel of witnesses for today's hearing includes Dr. Paul Hemmersbaugh, the chief counsel, National Highway Traffic Safety Administration, and Ms. Janet McCabe, acting Assistant Administrator for the Office of Air and Radiation, Environmental Protection Agency. We appreciate both of you being here today. We will begin the panel, I guess, with you, Ms. McCabe. You are recognized for 5 minutes for an opening statement, please.

STATEMENTS OF JANET McCABE, ACTING ASSISTANT ADMINISTRATOR, OFFICE OF AIR AND RADIATION, ENVIRONMENTAL PROTECTION AGENCY; AND PAUL HEMMERSBAUGH, CHIEF COUNSEL, NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

STATEMENT OF JANET McCABE

Ms. McCABE. Thank you very much, Chairman Burgess, Chairman Upton, Vice Chairman Olson, Ranking Members Schakowsky and Pallone, and other members of the subcommittees. I very much appreciate the opportunity to testify on the Environmental Protection Agency's greenhouse gas standards for light-duty vehicles and what we call the midterm evaluation process.

A little over 3 years ago, President Obama announced his climate action plan. That plan called on the Federal Government to do ev-

everything possible to combat the urgent threat of climate change using our current laws and authority, and EPA has responded to that call. EPA has adopted several rules under our Clean Air Act authority to reduce greenhouse gas emissions including the focus of today's hearing, our rules that will significantly reduce GHG emissions from light-duty cars and trucks.

The National Program for light-duty cars and trucks is the product of successful collaboration among EPA, NHTSA and California. The program was established with broad support and extensive input from the auto industry, and it is already driving substantial greenhouse gas reductions, oil savings, and savings for consumers.

In the 2012 rule that established GHG and fuel economy standards for model years 2017 through 2025, the agency committed to conduct what we call the midterm evaluation through which EPA will determine whether the greenhouse gas standards for model years 2022 through 2025 are still appropriate.

The first step in the midterm evaluation process was the preparation of a draft Technical Assessment Report, or TAR, which EPA, NHTSA, and California wrote jointly and released in July. The draft TAR is a comprehensive and robust technical analysis that delivers on our commitment to examine a wide range of factors relevant to the '22 through '25 standards.

Those factors include things like developments in different CO₂-reducing technologies and their penetration into the marketplace, whether there is consumer acceptance of new efficient technologies, trends in the vehicle fleet and many others. Significant analysis from EPA, NHTSA and California went into developing the draft TAR from state-of-the-art benchmarking testing of actual vehicles at EPA's lab to full vehicle computer simulations that look at how new technologies work together to reduce emissions.

Throughout this process we have made it a priority to share information with stakeholders in real time, including the publication of numerous peer-reviewed technical reports. The draft TAR was also heavily informed by what we learned from extensive outreach to a wide range of stakeholders including automakers and technology suppliers.

I would like to note a handful of the key initial findings from the TAR. First, the draft report shows that automakers are adopting CO₂-reducing technologies very rapidly. The innovation we have seen means there are over 100 car, SUV, and pickup versions on the market today from many manufacturers that already meet 2020 or later standards.

For consumers, this means that vehicles are getting cleaner and using less gas. Every single vehicle category from subcompacts to pickup trucks offers more fuel efficient, lower-emitting choices for consumers now than in years past. Furthermore, the initial finding in the draft TAR is that car makers can meet the standards at similar or lower costs than we had anticipated in our 2012 analysis.

Second, the agency's vehicle standards are working. The draft TAR briefly summarizes information showing how the industry has overcomplied with the GHG standards for each of the first 3 years of the program, and in 2014 they outperformed the standards by about 1.4 miles per gallon.

Third, our draft analysis is consistent with a key finding from the 2012 rule, namely that the 2022 through 2025 standards can be met largely with more efficient gasoline powered cars. Automakers have a wide range of technology pathways from which to choose, but it appears that advanced gasoline technologies will continue to be the predominant technologies with modest levels of what we call strong hybrids and very low levels of full electrification needed to meet the standards.

We believe that the analysis presented in the draft TAR underscores that the auto industry is well positioned to meet their customers' expectations while reaching significant new levels of environmental performance. As the comment period closes next week, we look forward to reviewing the public's input.

EPA's next step will be to develop and make available a proposed determination which will provide another opportunity for public review and comment. After consideration of any additional information and input and as required by EPA's regulations, EPA will issue a final determination as to whether the model years 2022 through '25 standards are still appropriate no later than April 2018.

Again, I thank you for the opportunity to serve as a witness at this hearing and look forward to your questions and the discussion. Thank you, Mr. Chairman.

[The prepared statement of Ms. McCabe follows:]

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Janet McCabe

Acting Assistant Administrator

Office of Air and Radiation

U.S. Environmental Protection Agency

Committee on Energy and Commerce

Subcommittee on Commerce, Manufacturing, and Trade

Subcommittee on Energy and Power

U.S. House of Representatives

September 22, 2016

Statement

Chairman Burgess and Vice Chairman Olson, Ranking Members Schakowsky and Rush, and other members of the Subcommittees, I appreciate the opportunity to testify on the Environmental Protection Agency's (EPA) greenhouse gas (GHG) standards for light-duty vehicles and what we call the Midterm Evaluation (MTE) process. I want to start by underscoring the urgent threat of climate change, and how EPA is fulfilling our mission to protect human health and the environment through actions to address this threat. Climate change is truly a global environmental problem that will require every country and every sector of the economy to take meaningful action to reduce the GHG emissions that contribute to

the problem. Despite the progress we've made to reduce GHG emissions, the climate continues to change before us.

Last month, EPA released a report called "Climate Change Indicators in the United States" that shows how our climate is changing and tracks the effects on Americans' health and our environment. I want to highlight a few key points from this report:

First, average annual levels of carbon dioxide (CO₂), the most important GHG driving the atmosphere to get hotter, recently exceeded 400 parts per million for the first time in at least 800,000 years. The last time there was this much CO₂ in the Earth's atmosphere, human civilizations didn't exist, and sea level was 40 feet higher than it is today.

Second, average temperatures are rising, and fast. Worldwide, 2015 was the warmest year on record and 2006–2015 was the warmest decade, and 2016 is on track to set another record for global temperatures.

And finally, the consequences of increasing levels of CO₂ and rising temperatures result in sea level rise, Arctic sea ice loss, ocean warming, extreme weather events such as floods, forest fires, droughts, coastal erosion, and ecosystem disturbances.

These are sobering facts, and this is why all of our work on reducing GHG emissions, and why we need to continue, indeed accelerate, the progress and innovation our country has shown – as the U.S. is the world leader on that front.

A little over three years ago President Obama announced his Climate Action Plan. That plan called on the federal government to do everything possible to combat the urgent threat of climate change using our current laws and authority, and EPA has responded to that call. EPA has adopted several rules under our Clean Air Act authority to reduce GHG emissions that are fueling climate change, including: the clean power plan to reduce carbon emissions from the power sector, standards to cut methane emissions from the oil and gas industry, an "endangerment finding" for aircraft GHG emissions,

and two sets of rules to significantly reduce GHG emissions from light-duty and heavy duty vehicles and trucks.

These light-duty vehicle rules are the core of what has become a truly National Program for reducing GHG emissions and fuel consumption, and are the focus of my remarks today. This National Program was the product of unprecedented collaboration among EPA, the U.S. National Highway Transportation Safety Administration (NHTSA), on behalf of the Department of Transportation (U.S. DOT), and the State of California – and, notably – with broad support and extensive input from the auto industry. And what a great partnership it has been with this complex industry over the years – key as it is to our economy and to job creation – as we’ve been able to work together to improve public health. The light-duty vehicle rules aimed to nearly double fuel economy with standards from model years (MY) 2012 through 2025, and are already driving substantial GHG reductions, oil reductions, and savings for consumers at the gas pump.

In the 2012 light-duty rule that established GHG and fuel economy standards for model years 2017-2025, the Agency committed to conduct what we call the “Midterm Evaluation.” Because of the long time frame at issue in the 2012 rule, EPA, in coordination with NHTSA and California, will develop and compile up-to-date information to inform the MTE. On the basis of this information, EPA will determine whether the GHG standards for MYs 2022 through 2025 are still appropriate. The rule established the factors that EPA should consider in making this determination. If EPA determines that the standards are not appropriate, then EPA will propose whether to make the standards either more or less stringent. The first step in the MTE process was preparation of a draft Technical Assessment Report – or TAR – which EPA, NHTSA, and CARB wrote jointly and released in July 2016. The agencies provided a 60-day public comment period for the Draft TAR, which ends next week.

The Draft TAR is a comprehensive and robust technical analysis, but I should emphasize that it is not a regulatory document with enforceable requirements. The Draft TAR delivers on our commitment to examine a wide range of factors relevant to the MY 2022-2025 standards, consistent with the regulatory commitment EPA established in 2012. It's a long list, and includes things like developments in different CO₂-reducing technologies and their penetration into the marketplace, whether there is consumer acceptance of new efficient technologies, trends in fuel prices and the vehicle fleet, and many others.

Significant analysis from EPA, NHTSA and California went into developing the Draft TAR, from state-of-the-art benchmarking testing of actual vehicles at EPA's National Vehicle Fuel and Emissions Laboratory to full-vehicle computer simulations that look at how new technologies work together to reduce emissions and improve fuel economy. Throughout this process, we have made it a priority to share information informing our assessment with stakeholders in real time, including publication of numerous peer-reviewed scientific papers and technical reports. The Draft TAR was also heavily informed by what we learned from extensive outreach to a wide range of stakeholders, including dozens of meetings with car makers and technology suppliers. And we considered the significant body of data, and numerous studies, that many organizations have produced in recent years including, importantly, the National Academies of Sciences, Engineering and Medicine.

Let me note some of the key initial findings from the Draft TAR. First, the draft report shows that automakers and suppliers are innovating. Manufacturers are adopting CO₂-reducing technologies very rapidly. In fact, we are seeing technologies that reduce emissions and improve fuel economy entering the fleet at faster rates than we originally expected. This innovation means that there are many vehicles meeting future standards several years ahead of schedule – there are over 100 car, SUV, and pickup versions on the market today, from many manufacturers, that already meet 2020 or later standards. The advanced technologies these vehicles are using include gasoline direct injection, more sophisticated transmissions, weight reduction, improved aerodynamics, and stop-start systems that reduce idling fuel

consumption. And, notably, these innovations have been occurring during a period when the automotive industry has seen six consecutive years of sales increases and a new all-time sales record in 2015. For consumers, this means that vehicles are getting cleaner and using less gas: every single vehicle category, from subcompacts to pickup trucks, offers more fuel efficient, lower-emitting choices for consumers now than in years past. Furthermore, the initial finding in the Draft TAR is that carmakers can meet the standards at similar or lower costs than we had anticipated in our 2012 analysis.

Second, the agencies' vehicle standards are working. While the Draft TAR analysis focuses on the MY 2022-2025 standards, EPA's annual Manufacturer Performance Reports, which the Draft TAR briefly summarizes, show how the industry over-complied with the GHG standards for each of the first three years of the program, and in 2014 outperformed the standards by 13 grams per mile of CO₂ or about 1.4 miles per gallon.

Third, our draft analysis is consistent with a key finding from the 2012 rulemaking that originally established the standards out through 2025, namely, that the 2022-2025 standards can be met largely with more efficient gasoline-powered cars. That is, the standards appear achievable using more efficient internal combustion engines, without significant use of electrification or alternative fuels. Automakers have a wide range of technology pathways from which to choose, but it appears that advanced gasoline technologies will continue to be the predominant technologies, with modest levels of what we call "strong hybrids" (like the Prius) and very low levels of full electrification needed to meet the standards. This draft finding is also consistent with what the National Academies found in their comprehensive 2015 study.

We believe that the analysis presented in the draft TAR underscores that the auto industry is well-positioned to meet their customers' expectations while reaching significant new levels of environmental

performance. As MY 2017 vehicles reach showrooms, the Obama Administration's national GHG and fuel economy program has already reduced carbon pollution emissions significantly and has saved Americans a lot of money at the pump at the same time.

The national GHG and fuel economy standards were established with the consumer in mind, and were explicitly designed to preserve consumer choice. A common misconception about the program is that the standards require *all* vehicles to achieve a specific, inflexible fuel economy or GHG reduction level. The program was designed, however, to allow standards to automatically adjust to changing market circumstances. In this way, consumers are not forced into one type of vehicle or another. In addition, automakers are using a wide variety of compliance flexibilities that were designed into the program, such as averaging and credit trading across their fleets. All cars and light trucks get cleaner over time, consumers have complete choice of what cars they buy.

The agencies designed the standards to preserve consumer choice. They are based on a vehicle's physical "footprint," defined by the area enclosed by the points at which the wheels hit the ground. Each year, each vehicle has compliance targets that reflect its size. The targets get more stringent over time and all vehicle types get cleaner. Each manufacturer has its own unique fleet-wide standard that reflects the average of the vehicles it chooses to produce to meet its customers' needs and wants. Manufacturers are not compelled to build vehicles of any particular size or type and no single vehicle is required to meet an individual target. This design of the program ensures that – despite future fluctuations in fuel prices, or new trends in consumers' buying habits – manufacturers can continue to offer a wide array of cleaner, more fuel-efficient vehicles to their customers for the life of the program. For this reason, as lower gas prices and other factors resulting in consumers purchasing relatively fewer passenger cars and more larger vehicles like cross-overs, SUVs, and pickup trucks, automakers' standards are adjusting accordingly. This means the program adjusts to the marketplace – exactly as we had designed it to do – and that consumer choice is preserved.

As the comment period closes next week, we look forward to reviewing the public's input. As required by EPA regulations, EPA will issue a Proposed Determination as to whether the MY 2022-2025 standards are still appropriate, which will be informed by the public input we receive on the Draft TAR and other new data and information. In addition to the opportunity to comment on the Draft TAR, there will be a public comment period on EPA's Proposed Determination. Under EPA's regulation, EPA must make a Final Determination on the appropriateness of the MY 2022-2025 standards no later than April 2018.

Again, I thank you for the opportunity to serve as a witness at this hearing.

Mr. BURGESS. The Chair thanks the gentlelady. Mr. Hemmersbaugh, you are recognized for 5 minutes for an opening statement, please.

STATEMENT OF PAUL HEMMERSBAUGH

Mr. HEMMERSBAUGH. Thank you, Mr. Chairman. Mr. Chairman and members of the committee, my name is Paul Hemmersbaugh. I am the chief counsel of the National Highway Traffic Safety Administration which Congress has charged with setting Corporate Average Fuel Economy, or CAFE standards. Thank you for the opportunity to testify.

Today I would like to update you on the status of NHTSA's work on the midterm evaluation and answer any questions you may have. At the outset, I would like to emphasize a few points about two primary topics of this hearing—the midterm evaluation and the draft Technical Assessment Report, or TAR.

First, the TAR is the initial step in the midterm evaluation process for CAFE and greenhouse gas standards for 2022 to 2025. The TAR will be used to inform future decisions about the standards for those years. The TAR is not a decision document. It does not change the standards that are currently in place.

Second, the administration's vehicle standards are working and consumers are accepting more efficient vehicles. While the TAR focuses on model years 2022 to '25, the stringency of the standards has been increasing steadily since model year 2012 and manufacturers have been meeting those standards. At the same time, the automotive industry has seen 6 consecutive years of sales increases with a new all-time sales record in 2015. This means that consumers are buying and benefiting from more efficient vehicles with lower greenhouse gas emissions while saving money on fuel costs.

Third, our analysis indicates that the standards can be met largely with more efficient gasoline powered cars and with modest levels of what we call strong hybrids, like a Prius, and very low levels of full electrification. While it is up to automakers what technologies they choose to use, advanced gasoline technologies can continue to predominate if that is what the market demands.

As background, the Energy Independence and Security Act of 2007, or EISA, directed NHTSA to set attribute-based fuel economy standards for both cars and trucks rather than the previous flat standards that prescribed a single miles per gallon value. This approach allows the CAFE program to be more responsive to changes in consumer demand.

If a manufacturer builds larger vehicles because gasoline prices are low and U.S. consumers then thereby demand bigger cars and trucks, then that manufacturer's compliance obligation will be lower reflecting the footprints of the vehicles it builds. Fuel economy overall should continue to improve year after year because the footprint standards continue to increase in stringency every year.

NHTSA and EPA issued a final rule in 2012, representing the second phase of what the agencies refer to as the coordinated National Program. The National Program refers to the way that NHTSA, EPA and the California Air Resources Board work together to create and coordinate standards and to accomplish the goals of energy conservation and emissions reduction.

The midterm evaluation is an integral step to informing NHTSA's CAFE rulemaking process, and the TAR is the first step in that process, the TAR's comprehensive and robust report informed by extensive stakeholder outreach and substantial technical work by the agencies over the past several years.

Public comment and input on the TAR will be used to inform and develop NHTSA's proposal for its de novo rulemaking for model years 2022 to '25 standards. NHTSA's subsequent rulemaking will consider all relevant information and conduct a fresh balancing of statutory factors in order to determine the maximum feasible CAFE standards for model years 2022 to '25.

I would like to highlight a few additional key results of the TAR analysis. The TAR shows that automakers are adopting fuel economy technologies at unprecedented rates. These technologies are helping manufacturers meet, and in many cases exceed, applicable standards. In fact, many of today's vehicle models are already meeting future fuel targets.

The TAR also includes a comprehensive update of the compliance costs of the program including a review of the numerous possible technologies that automakers may use to meet the standards. EPA and NHTSA modeling were done largely independently using different technology inputs and different modeling tools. This is a strength of the TAR. The independent and parallel analyses provide complementary and analytically robust results.

NHTSA's assessment shows that the costs of meeting the augural standards for model years 2022 to '25 are comparable to what we found they would be in 2012 at approximately \$1,200 per vehicle. At the same time, the average model year 2025 vehicle will save over 1,900 in fuel costs over its lifetime. In sum, the TAR delivers on the agencies' commitment to examine a wide range of factors that affect model years 2022 to '25 standards.

The next step is reviewing the comments we receive on the TAR. NHTSA will continue to work with Congress and stakeholders as it seeks to meet its statutory requirements while implementing the National Program. Thank you again for the opportunity to testify today. I look forward to your questions.

[The prepared statement of Mr. Hemmersbaugh follows:]

Statement of
Paul Hemmersbaugh
Chief Counsel, National Highway Traffic Safety Administration
House Energy & Commerce Committee Hearing on Mid-Term Evaluation of National Program
Washington, DC
Thursday, September 22, 2016

Chairman Upton, Chairman Burgess, Ranking Member Schakowsky, Vice Chairman Olson,
Ranking Member Rush, and Members of the Committee:

My name is Paul Hemmersbaugh. I am the Chief Counsel of the National Highway
Traffic Safety Administration (NHTSA), which has been entrusted by Congress to set Corporate
Average Fuel Economy (CAFE) standards.

Thank you for the opportunity to testify regarding the Administration's National Program
for greenhouse gas (GHG) emissions and fuel economy standards for light duty cars and trucks.
Today I would like to update you on the status of NHTSA's work on the Mid-Term Evaluation
(MTE), and answer any questions you may have.

At the outset, I want to emphasize a few general points about the two primary topics of
this hearing—the Mid-Term Evaluation and the Draft Technical Assessment Report, or TAR.

First, the TAR is only the initial step of the MTE for light-duty vehicle fuel economy and
greenhouse gas emissions standards. The TAR is focused on the model years (MY) between
2022 and 2025, and will be used to inform future decisions about the standards for those years.
The TAR is not a decision document. The TAR does not change the standards that are currently
in place, either for NHTSA for model years between now and 2021, or for EPA for model years
2022 to 2025. Pursuant to statute, NHTSA will be conducting a de novo rulemaking to develop
standards for these years.

Second, the Administration's vehicle standards are working, and we are happy to report that consumers are buying more fuel efficient vehicles. While the TAR analysis focuses on the MY2022-2025 standards, it also discusses recent performance. Under current standards, stringency levels have been increasing steadily since model year 2012, and manufacturers have been meeting those standards. This occurred during a period in which the automotive industry has seen six consecutive years of sales increases and a new all-time sales record in 2015. That means consumers are buying, and benefiting from, more efficient vehicles with lower greenhouse gas emissions, and saving money on fuel costs.

Third, our new analysis confirms that the standards can be met largely with more efficient gasoline-powered cars. Automakers have a wide range of technology pathways to choose from, but advanced gasoline technologies will continue to be the predominant technologies, with generally moderate levels of what we call "strong hybrids" (like a Prius) and very low levels of full electrification (like a Chevy Bolt or a Tesla) needed to meet the standards. In fact, many of today's vehicle models are already meeting future fuel economy targets. Many vehicles – from many manufacturers – are meeting future targets several years ahead of schedule.

I would like to take a moment to describe this important program. The National Program—developed by NHTSA and EPA in coordination with the California Air Resources Board—is designed to enable consumers to choose the car or truck they want, while ensuring that the vehicles they buy will continue to save on fuel costs and consumption, and cut greenhouse gas emissions. This joint program is overseen by NHTSA and EPA.

The Department of Transportation established national fuel economy standards following passage of the Energy Policy and Conservation Act (EPCA) of 1975. That Act directed the

Secretary of Transportation (and by delegation, NHTSA) to set standards separately for passenger cars and light trucks at maximum feasible levels in each model year. The first fuel economy standards issued by NHTSA took effect in model year 1978. Congress has amended EPCA several times to provide further direction.

Through the Energy Independence and Security Act (EISA) of 2007, Congress gave NHTSA additional authority for the CAFE program. It directed NHTSA to set attribute-based fuel economy standards for both cars and trucks, rather than the previous flat standards which imposed a single miles-per-gallon value. This approach has allowed NHTSA to implement a CAFE program that is more responsive to changes in consumer demand.

The standards that we currently have in place were specifically designed to preserve consumer choice while ensuring that light duty vehicles of every size continue to improve and yield savings for consumers and reduce petroleum consumption and emissions. They are based on annual “footprint curves” where each vehicle model has a target based on its size, which are used to calculate each manufacturer’s overall average annual requirement. Manufacturers can thus build vehicles that reflect consumer preference and real-world fleet mix, because their overall corporate average requirement will be calculated based the models and volume that they actually produce. The standards get more stringent across all types of vehicles over time, ensuring that all classes of vehicles improve. Working in that way ensures that – despite any future fluctuations in fuel prices, or new trends in consumers’ buying habits – manufacturers can continue to offer a wide array of cleaner, more fuel-efficient vehicles to their customers for the life of the program.

The agencies finalized the first set of National Program standards covering model years 2012-2016 in May 2010, and a second set of standards, covering MYs 2017-2025, in October

2012. The National Program establishes fuel economy and greenhouse gas emissions standards that increase in stringency each year from model year 2012 through model year 2025. Presently, standards are projected to reach a level by 2025 that will nearly double fuel economy and cut greenhouse gas emissions in half as compared to model year 2008. The coordinated National Program allows automakers to build one single fleet of vehicles across the U.S. that satisfies all GHG and CAFE requirements. At the same time, these standards afford consumers a full range of vehicle choices that meet their needs.

NHTSA and EPA committed in the 2012 final rule to conduct a comprehensive mid-term evaluation for the model year 2022-2025 standards. Because EISA limits NHTSA to setting CAFE standards for five years at a time, the model year 2022-2025 CAFE provisions in the 2012 final rule were only “augural,” reflecting NHTSA’s best judgment of what standards would have been the maximum feasible at that time, based on the information then available. The mid-term evaluation is an integral tool for informing NHTSA’s forthcoming rulemaking process to establish model years 2022-2025 CAFE standards, and the TAR is the first step in that process.

The TAR is a technical document designed to update and analyze relevant data and information, and to give stakeholders an opportunity to provide input on that data and analysis. Commenters can tell the agencies what they think we are getting right and what they think we are getting wrong, and suggest adjustments.

EPA, NHTSA, and CARB jointly developed the TAR, which we published in July, and it is presently available for public comment. The TAR is a comprehensive and robust report, informed by extensive stakeholder outreach and substantial technical work by the agencies over the past several years. It is worth repeating that the TAR *is not a rulemaking or decision document* and *does not change existing standards or legal requirements* under the National

Program. Rather, the TAR, and public comment and input on it, will be used to inform and develop NHTSA's NPRM for its *de novo* rulemaking for standards for model years 2022-2025.

The next step for NHTSA is to commence a *de novo* rulemaking, which will consider all relevant information, including comments submitted in response to the TAR, and conduct a fresh balancing of statutory factors in order to determine the maximum feasible CAFE standards for model years 2022–2025. Public input on the research and analysis presented in the TAR will inform NHTSA's proposed rule and EPA's MTE determination process, and the public will again have the opportunity to comment. NHTSA, EPA, and the California Air Resources Board (CARB) have closely coordinated efforts, in order to advance our commitment to maintaining a single National Program to address GHG emissions and fuel economy.

The TAR delivers on the agencies' commitment to examine a wide range of factors that may affect the MY 2022-2025 standards. Those factors include developments in powertrain technology, vehicle electrification, mass reduction and vehicle safety impacts, the penetration of fuel efficient technologies in the marketplace, consumer acceptance of fuel-efficient technologies, trends in fuel prices, trends in the vehicle fleet, and many others.

Key Features and Findings of the TAR

I would like to highlight a few more of the key results of the TAR analysis. The TAR shows that automakers are innovating in a time of record sales and fuel economy levels. It also shows that manufacturers are adopting fuel economy technologies at unprecedented rates. These technologies—such as gasoline direct injection, more sophisticated transmissions, weight reduction, aerodynamic improvements and start-stop systems—are helping automakers meet, and in many cases exceed, applicable standards. Moreover, these technologies

are being adopted at costs similar to those that NHTSA anticipated in our 2012 rulemaking. In fact, many of today's vehicle models are already meeting future fuel economy targets.

The TAR analysis also shows the industry can meet its targets using advanced gasoline technologies as the predominant technologies, generally with moderate levels of hybrids and very low levels of fully electric vehicles. This finding is consistent with what the National Academy of Sciences found in 2015. And, NHTSA's assessment shows that the costs of meeting the augural standards for model years 2022-2025 are comparable to what the Agency found they would be in 2012, at about \$1,200 per vehicle, while the average model year 2025 vehicle will save over \$1,900 in fuel costs over its lifetime.

To conclude where I began, the TAR delivers on the agencies' commitment to examine the full range of technological, safety, and marketplace factors that affect the MY 2022-2025 standards; it shows that the Administration's vehicle standards are working, it shows that technologies that reduce emissions and improve fuel economy are entering the fleet at faster rates than originally expected.

On behalf of NHTSA, I commit to you that our door is open and we are listening, and will continue to listen, to stakeholder feedback and input that will inform the eventual setting of CAFE standards for model years 2022 and beyond. NHTSA will continue to work with Congress and stakeholders as it seeks to meet its statutory obligations and implement the National Program.

Thank you for the opportunity to testify today. I look forward to your questions.

Mr. BURGESS. The Chair thanks the gentleman. I thank you both for your testimony, and we will move on to the question-and-answer portion of the hearing. I will recognize myself 5 minutes to begin that questioning.

Mr. Hemmersbaugh, one of the things I like so much when Administrator Rosekind comes before our subcommittee, he always brings the graph of how automobile fatalities have declined under the, really, the past 4 or 5 decades. But it does seem that there has been a little bit of a plateau or a break in that steady reduction, and it does raise the question what are the factors that are responsible for that.

Can you just speak briefly to the balance between the investment that automobile manufacturers are going to have to make in meeting the new Corporate Average Fuel Economy standards and the investment in additional safety features in the automobiles that we buy?

Mr. HEMMERSBAUGH. In the first instance I would like to emphasize that we are open to comments on our program on the augural standards that the—this is the first part, and so we are really gratified to have an opportunity to go through a transparent process whereby all different issues including safety issues are raised with respect to the CAFE standards.

The CAFE standards currently take into account, in fact one of the 13 chapters of the TAR is dedicated to safety considerations. And we very much are concerned as a safety agency, safety is our middle name. We are very interested in preserving safety and not sacrificing safety in order to make fuel economy gains.

So our models have built into them limitations on weight, what they call mass reduction, and we always consider safety, and we believe that manufacturers as well as responsible public, private agencies will take that into account as well. And so we don't think that there is a conflict between safety and fuel economy.

Mr. BURGESS. You know, last week we had a hearing on advanced robotics and it was a very interesting hearing. One of Chairman Upton's constituents, Dean Kamen, at the end of the hearing we talked a little bit about autonomous vehicles, and of course we are asking automobile manufacturers to work with your agency and work with the Congress on developing that technology.

And Mr. Kamen had just a very interesting observation at the end of his testimony. He said there will be a time when we look back on this time and wonder why we didn't already have autonomous vehicles. And he referenced the fact that so many of us are too sleepy or whatever, impaired behind the wheel or texting or distracted, and really we ought to leave the driving to the robots and not to the driver.

So it was an interesting philosophical approach. And that is one of the great things about this subcommittee is we do—someone told me the other day, sometimes they look at this subcommittee as kind of being the think tank for the Energy and Commerce Committee in the future of commerce, manufacturing, and trade.

But I really am concerned and I just want to stress that we do need to balance the investments that need to be made in future automotive safety.

Golly, we lost two mothers and two daughters in a head-on collision back in my district a few months ago. A mom and her daughter were driving in one car; a mom and her daughter driving in the other car. Apparently a distracted driving situation where someone left their lane and went into the oncoming lane of traffic. And had a community that was devastated; two schools that were devastated. If there is technology that is just over the horizon that can prevent this type of accident from occurring, I mean, I am all for it. I want to see that day coming.

I remember buying my first cars for my children, which now is many years ago, and philosophically I wanted to get the cheapest jalopy I could get for them because I was cheap, tight. And someone pointed out, you really don't want to put a teenager in a car without anti-lock brakes. And I think that same philosophy now fast-forwarded to whatever 3 decades, 4 decades, and putting a teenager in a car without a lane departure warning or autonomous automatic braking will seem like something no thinking parent would do.

So I mean, I recognize that the future is very involved as far as auto safety. We are going to hear from our manufacturers later. I mean, I want them to be developing the technologies that are going to keep the driving public safe. Of course, that is your agency's charge. So I just hope we are careful about balancing these two things as we go forward. I will listen to your observations on that if there are anything further you would like to add.

Mr. HEMMERSBAUGH. Well, thank you. And we are indeed have safety uppermost in our mind in nearly everything we do at the agency. As you may have seen, we just earlier this week introduced an automated vehicle policy and we are very bullish on the safety prospects of that technology and we are doing what we can to encourage the development and to encourage the safe and responsible deployment of automated vehicles technology.

And that is something that we are, as I said, really excited about the prospects for safety as well as increased mobility for people with disabilities. We just think there is a whole panoply of potential benefits. And if we can get this right and that is a big if, but if we can facilitate the safe deployment of these automated vehicles, I think we will have tremendous safety benefits and perhaps largely eliminate auto crashes as a source of loss of life in the United States.

Mr. BURGESS. The Chair thanks the gentleman, and the Chair recognizes Ms. Schakowsky of Illinois, 5 minutes for your questions, please.

Ms. SCHAKOWSKY. First, I just wanted to comment that fortunately I think we have made great advances in auto safety as well as fuel efficiency, and that the two do not cancel out each other in any way, and all the evidence is in to say that.

I wanted to ask Ms. McCabe a question. In 2009, EPA issued the finding that elevated concentrations of greenhouse gases in the atmosphere endangered human health and welfare. And since then, the climate has continued to change with new records being set for a number of climate indicators such as average temperature, vanishing arctic sea ice, carbon dioxide concentrations, and sea levels.

So Ms. McCabe, the draft TAR, Technical Assessment Report, examined recent scientific literature related to climate change and the impact of increasing greenhouse gas emissions. What are some of the climate impacts discussed in the report?

Ms. MCCABE. Yes, thank you, Congresswoman, for that question. We do discuss that at great length in the TAR. There are also a number of other documents that the Federal Government has put out recently addressing these sorts of issues that maybe are a little bit more accessible to people in terms of the things that scientists are observing.

One of the most accessible, I think, is temperature. So 2015 was the warmest year on record. The last decade has been the warmest decade on record. 2016 is gearing up to set another record as well. So in terms of temperatures, in terms of increased droughts, storm severity, loss of ice in the arctic, rising sea levels, increased coastal flooding, those are a number of the kinds of impacts that scientists are seeing in the climate.

Ms. SCHAKOWSKY. Thank you. Understanding the impact our emissions have on the atmosphere is particularly important for today's hearing since the transportation sector accounts for roughly a third of total greenhouse gas emissions in the U.S. with light-duty vehicles making up more than 60 percent of the emissions in that sector.

So how have the light-duty standards helped curb greenhouse gas emissions in the United States and what level of emissions reductions can we expect to see when these standards are fully implemented?

Ms. MCCABE. This is a critical element of any program to mitigate greenhouse gases. As you acknowledge, this is a significant portion of the inventory. We predicted in 2012 that over the lifetime of this program that there would be about a six billion ton reduction in emissions from these vehicles. And the TAR that we have just completed, while it focuses in on the 2022 through 2025 period we are in the same area of reductions over the lifetime of the program and in that last 3 to 4 years of the program it is about 540 million tons.

These are substantial. I think we say a lot that it is going to take many, many things in order to address greenhouse gases because they come from a lot of sources, but when you can find a category that contributes this much and you can find cost effective ways of reducing those emissions it is really important to do that.

Ms. SCHAKOWSKY. I really appreciate that focus. And finally, Ms. McCabe, what role do the light-duty standards play in meeting our Nation's climate goals, if you could reiterate that?

Ms. MCCABE. Yes. Well, we have been charged under the Clean Air Act to address air pollution that endangers the public health and welfare. It is clear that CO₂ is one of those air pollutants. And so a major source of activity of ours under the Clean Air Act for 40 years has been reducing air pollution from the auto sector. And so these particular rules are a major element of our target, of our plan to reduce greenhouse gases as much as can reasonably and cost effectively and safely be done.

Ms. SCHAKOWSKY. Thank you. I said that was the last but I have one more. We have heard the argument that in order to meet the

next round of standards, automakers will have to add a large number of plug-in electric, plug-in electric hybrid and other zero-emission vehicles to their fleet.

I support efforts to increase the number of electric and alternative fuel vehicles, but that is not really the issue here. This is about the National Program which aligns greenhouse gas standards with CAFE standards. And since these standards are based on each vehicle's footprint and not a universal average, this talk of requiring electric cars appears to miss the point.

And I am wondering, Ms. McCabe, can you explain how each automaker is given a unique fleet average based on the individual footprint of the vehicles they sell, and would it therefore be possible for a manufacturer to produce exclusively light trucks, SUV, and crossover vehicles and still be in compliance with the upcoming light-duty standards?

Ms. MCCABE. Yes, absolutely. The standards, I wasn't around when these standards were initially designed so I can compliment them without complimenting myself. I just think they are very ingeniously designed in order to provide as much flexibility for the automakers and as much choice for the consumers as possible. So as you say, we don't set one expectation across the entire fleet. Every automaker, depending on the vehicles they produce, will have its own calculated target for what it should achieve.

And going to your question about electric vehicles, what we found in the draft TAR is that due to the innovation and pioneering spirit as was said before, the automakers are just moving along like gangbusters in developing technologies that apply to gasoline engines.

So what we found is that in order to achieve those standards, while electric cars and other zero-emitting vehicles are certainly welcome in the program they are not largely necessary to get each automaker to where they need to be. And as I say, each one will have a target tailored specifically for them based on the cars that they produce, which is based on what they believe they will be able to sell to the American public.

Ms. SCHAKOWSKY. Right. Thank you so much. I yield back.

Mr. BURGESS. The Chair thanks the gentlelady. The gentlelady yields back. I now recognize the chairman of the Energy and Power Subcommittee, Mr. Olson from Texas, 5 minutes for questions, please.

Mr. OLSON. I thank the Chair. Welcome, Dr. Hemmersbaugh and Ms. McCabe. Ms. McCabe, it is great to have you here, because I know you are here for what I imagine is very difficult personal times. You spent some time in Boston as has your boss, Administrator McCarthy. You are probably fond of the New England Patriots. Now as you all know, my Houston Texans are going up there tonight, 7:25 kickoff, to crush the Patriots. But enough on—let's get serious.

Mr. TONKO. May I have a point of order on that one?

Mr. OLSON. If I had more time. But being serious, the regulatory impact assessment of 2012, final rule, EPA ballparked that these vehicles standards reduced temperatures by 0.0074 to 0.0176 degrees Celsius by the year 2100, 84 years from now. You also said

this reduces sea level rise by as little as 0.71 centimeters. We are looking at amounts too small to even verify.

Given that the overall program has a very modest effect on global warming, wouldn't you agree that adjustments to the program like revising targets in the out years or harmonizing the training program would also have a modest impact on the environment? Would you agree with that?

Ms. MCCABE. Well, Congressman, first, while I cheer for any team that my boss is in favor of, I have to confess that I live in Indianapolis. So I am not sure when your team is going to play the Colts, but we can—

Mr. OLSON. Your quarterback came from Houston, Texas, by the way.

Ms. MCCABE. OK. Well, you have just exceeded my knowledge on football.

To answer your question, sir—and we have had this conversation before—I think the fact is that climate change is a global problem and there are sources that are contributing from a wide variety of types of activities. And no one single activity is going to be what we need in order to address the threat of climate change. It is going to take the cumulative accomplishments of a number of different strategies from not only the U.S. but from countries around the world in order to make the difference that we need to see in the climate. And this is an important part of that strategy.

Mr. OLSON. So you agree that this is a modest environmental impact. So given that fact and the fact that these rules will cost over \$200 billion, and that 2017 through 2025 standards alone come in at \$157 billion making it the most expensive automobile regulations in history, are these modest gains worth the cost?

Ms. MCCABE. Well, Congressman, I wouldn't actually refer to this as a modest impact. I would refer to this as a significant impact given the significance of this sector. And I think that I would—we are welcoming all comments on the cost and the benefits of this program as people give us comments on the draft TAR and all that information is laid out. But what this TAR has found is that the costs are that we predict now for the out years of the program are in line with the costs that we predicted back in 2012 and there has been exhaustive research and updating of our information in order to reach that technical conclusion. But we welcome everybody's views on those points.

Mr. OLSON. Well, it is clear we disagree on the fact that the facts are the reduction of the temperatures, 0.0074 to 0.016 degrees Celsius is not something significant in my humble opinion.

But moving on, this is for Dr. Hemmersbaugh. In EPA's testimony they commented that these standards are achievable without, quote, significant use, unquote, of electric cars. That of course means consumers in a low gasoline price world want smaller and lighter vehicles. The automakers in Panel 2 have some serious concerns about whether these assumptions are accurate. Can you talk about consumer acceptance and demand for super-efficient or electric cars and what trends you are seeing in that market in the real world?

Mr. HEMMERSBAUGH. Initially, I would like to lay a little groundwork as to the way these standards work. And these standards as

you know are footprint-based standards. So each different footprint of a vehicle has a different target fuel consumption, and it is the average over all the vehicles, all the fleet from the smallest to the largest truck that result in the Corporate Average Fuel Economy target or standard that each manufacturer has to meet.

Manufacturers have great flexibility in determining what sorts of cars they choose to produce in order to meet those standards. Similarly, consumers have, consumer choice is preserved by these footprint standards that we didn't have before 2007. But when Congress amended the statute, you wisely provided a process and a standard and a framework that accommodates consumer choice.

While I understand that the automakers have estimated that they may have to produce large numbers of hybrids in order to meet the standards in the years 2022 to 2025, which again as far as NHTSA is concerned there are no standards. We have to do an entirely new rulemaking before we make those standards, so we just have what we call augural standards. It is sort of a hypothetical projection of what those standards would be based on what we knew in 2012.

All that said, the manufacturers are able to produce whatever mix of vehicles they wish in order to comply with the greenhouse gas standards and the fuel economy standards as well. So it is really up to what the consumer choice and what the manufacturer choice is as to what mix of vehicles they will build and sell.

Mr. OLSON. I am out of time. Go Texans. I yield back.

Mr. BURGESS. The Chair thanks the gentleman. The gentleman's time has expired. The Chair recognizes the gentleman from California, Mr. McNerney, 5 minutes.

Mr. MCNERNEY. Well, I thank the Chair. I don't really need to brag about California teams, so I won't do that.

But industry usually squawks when emissions or safety standards are issued that the costs are going to go through the roof; that the sky is going to fall. But American innovation has proven established industry wrong time and time again. I don't think I even need to give examples.

But now as I went over in my opening statement and as you all confirmed in your statements, American innovation is exploding again here. I was struck by the positive tone of both of your opening statements.

So Mr. Hemmersbaugh, you mentioned that automakers are adapting at a great rate to the new regulations. I know that in California we are creating jobs. Tesla is there, battery manufacturing, and other manufacturing related to automobile are creating thousands of jobs. So how are these standards affecting employment in the rest of the country?

Mr. HEMMERSBAUGH. I don't have a good answer for that or good data for that. I would be happy to bring it back to you if you want to submit a question for the record, or we can just send it back to you. But the employment impacts is not something that we closely track. We do consider economic effects overall in setting the standards, setting the maximum feasible standards, but we have not to my knowledge closely looked at specific employment, and certainly not specific regional employment effects.

But as I said, we will be happy to respond to that when I am back at the office and can get my fingers on——

Mr. MCNERNEY. Well, that might be a good thing to include in your analysis. And you mentioned that the EPA and NHTSA's modeling were done independently. Could you describe the model a little bit, what is involved in it, how it works. Is it a computer model?

Mr. HEMMERSBAUGH. They are computer models. They are extremely complex. The NHTSA's model starts out with modeling of technological effectiveness rates from a model developed and used by the Argonne National Laboratory, which is also by the way the model that most of the auto industry uses.

That develops certain further inputs that are then input to the NHTSA CAFE model, or we sometimes call it the Volpe model because those are at the Volpe Center, the people who run that model for us. And then from that we generate the numbers and the analyses that we then slice and dice and figure out different effects and different costs.

Mr. MCNERNEY. And some of this is peer reviewed in papers, in academic papers and so on?

Mr. HEMMERSBAUGH. Yes. Yes. The models have been peer reviewed. The Argonne Lab standard, I think, is pretty much the gold standard for this kind of modeling and it is something that we have used over time. Our CAFE standard is structured around our statute. The CAFE model is built to fit the statutory requirements and so forth, so it is a particularly, we believe, well fitting, tight fitted model that has benefited from not only peer review but a lot of stakeholder input over time.

Mr. MCNERNEY. Thank you.

Ms. McCabe, again very positive. Automakers are adapting rapidly. They are meeting standards at lower costs than expected. They are outperforming standards and the auto industry is well positioned. Those are some of the statements you made. Could you expand on the statement that they are meeting standards at lower costs than expected?

Ms. MCCABE. Well, sure. And before I do I just want to note in response to a question you asked earlier, there is a discussion of employment impacts in the draft TAR, and we predict fairly modest employment increases related to the development of new technologies. But I also point out that there are record car sales for the last couple of years, and so things are going well in the industry.

So what we did in developing the TAR was to gather as much information as we could about the technologies that automakers are using, expect to be using, and based on some of our own work of where we actually have vehicles in our lab and take them apart and put them back together and try different things out.

So we were able to discern that some of the technologies that we expected not until later in the program are already being implemented in these early years, and that the cost of the vehicles are in line with what we expected out in the later years of the program at about between 900 and \$1,100 per car when you get out to the end. So the technologies are clearly moving ahead more quickly than anybody anticipated.

Mr. MCNERNEY. And the savings in terms of gasoline or fuel consumption is greater than the initial cost?

Ms. McCABE. Well, to the extent that there are more choices of cars that are beating where we expected the standards to be, every additional mile per gallon is money saved for that motorist.

Mr. MCNERNEY. Thank you, Mr. Chairman.

Mr. BURGESS. The gentleman yields back. The Chair thanks the gentleman. The Chair recognizes the gentleman from West Virginia, Mr. McKinley, 5 minutes for questions, please.

Mr. MCKINLEY. Thank you, Mr. Chairman. There are certainly a lot of issues we could go in this direction. I have heard some people speaking first about the global climate change and the impact, and I think we all realize that through the CAFE standards it is going to have virtually no impact on the global climate change. You and I both know that.

And I think having the CAFE standards, the interesting part is that the thing apparently we are willing to do is ignore the cost of life and injuries that have occurred as a result of our efforts in America to reduce our consumption. That they have said in this report that 46,000 people have died in crashes in cars—if they had simply been driving a heavier car in that time. But people are trying.

So in a feel-good mood to try to get our CAFE standard, get our less consumption, we are going to smaller, lighter cars. We know that 23 percent of the weight of a car has been reduced over the numbers of years. That has increased the number of rollovers and increased the number of deaths.

So this feel-good attitude that I hear in Congress and through this administration of trying to enhance this, it is not going to affect the environment—we know that—and it is also putting the lives of people at risk. And I think we all, even from the National Highway, your own report has come out and said that for each 100 pounds that you reduce you are going to increase the accident or the death rate one percent of people driving cars.

I don't accept all of that. I know it is fact like that but I am not accepting that that is the direction we should be going in. But we are going to lose that argument, we understand. The feel-good attitude from this administration and some folks here want to have us continue in that direction.

What I am more, equally as concerned about are people in rural America that this cost that you are imposing on us is going to be passed on to the consumer. And we are seeing from, I guess it is from the National Highway, someone has come up or said that it is going to increase the price of cars somewhere in the neighborhood of \$2,000 to \$3,000 to make this achievement.

But having said that how do we justify increasing that cost to people in low-income States like West Virginia or Arkansas or Mississippi, because we have to buy those cars too. It is one thing if you want to promote the car in Connecticut or Maryland, where there are \$70,000 median family incomes, but in rural America it is in poorer States at \$38,000, \$39,000 or \$40,000, that is a big discrepancy.

But yet we are trying to buy the same car, and because of this feel-good attitude that we are having with it that this report that

I have been given says that we are going to reduce, with this increase of the vehicles we are going to reduce, three to four million people aren't going to be able to buy a new car. And we are going to remove 5.8 to 6.8 million people, licensed drivers, to be able to buy a new car and we are forcing them to buy an older car. I am troubled with this.

So how all would you respond? Do you think these reports are wrong from the insurance groups or the other entities that have put out reports about safety and cost? Who can answer that?

Mr. HEMMERSBAUGH. I will start. With respect to the cost and the concern about pricing people out of the ability to buy cars, I want to give you a few numbers. The overall cost we estimate in the TAR, the overall cost of this rule by 2025 if we kept the same standards, which again we are going to revisit those standards, but if we kept the standards it would \$87 billion. At the same time, the overall benefits we estimate are \$175 billion, so essentially—

Mr. MCKINLEY. Am I supposed to feel good in West Virginia, then? I can't buy a car, but health benefits are going to improve around the country? I want to get back to specifics. Don't talk at 30,000 feet to me. Get down to what, if that cost, the increase of that cost is going to be a car of \$3,700, how is someone with a \$36,000 median family income going to be able to afford a new car?

Mr. HEMMERSBAUGH. I have a couple thoughts on that. One is let's bring it down to an average per car. We estimate in the TAR, we, NHTSA, estimates in the TAR that the average cost increase for a car by 2025 will be approximately \$1,200. That \$1,200 is more than completely offset by an estimated \$1,900 in savings, in fuel savings, and that is just fuel alone. That doesn't take into account the climate benefits and the things about which some disagreement has been expressed.

Mr. MCKINLEY. I am sorry. My time is expired, but if I could reclaim it. It says based on the National Highway Traffic Safety it is \$2,937, not 800-and-some dollars, sir.

Ms. MCCABE. Congressman, if I could clarify just a couple of things. I want to make clear that everybody understands that, given the design of the program, nobody is required to buy any particular car. The automakers in fact are and will be able to offer a wide range of cars going from very modestly priced cars as they do now to higher-end cars as they do now. And so there will be cars available for people in every income level, and they will save money immediately because of paying less for gas.

I also wanted to clarify that the first comments you made before—and Mr. Hemmersbaugh may want to add to it as well—in terms of lightweight cars, the whole design of this footprint-based approach to the cars is to make sure that we are not sacrificing safety for this environmental and fuel economy benefit. This program does not require cars to be made lighter. It allows the automakers to provide a range of cars so that they can fully take into account all of those considerations.

Mr. BURGESS. The gentleman's time has expired, so I thank the gentleman. The Chair recognizes the gentleman from New York, Mr. Tonko, 5 minutes for questions.

Mr. TONKO. Thank you, Mr. Chair. Ms. McCabe and Dr. Hemmersbaugh, welcome, and thank you for your work, very important to our environment.

Is it accurate that for each size or footprint of vehicle there is an individual fuel economy target set?

Mr. HEMMERSBAUGH. Yes. That is correct.

Mr. TONKO. And is it accurate that, instead of a uniform CAFE standard, each manufacturer now has a unique CAFE standard?

Mr. HEMMERSBAUGH. Yes, each manufacturer has a Corporate Average Fuel Economy standard.

Mr. TONKO. And that is based on what? Is it the vehicles that they manufacture and sell or—

Mr. HEMMERSBAUGH. So as you rightly stated at the start, there are based on the footprint of each vehicle, or that is essentially the area defined by a square under the wheels of the car, for each footprint for area occupied by a car there is a different standard.

So depending on the manufacturer's mix of vehicles, you average the target fuel economy into a single thing for each manufacturer's fleet which comes up to an average, or the Corporate Average Fuel Economy. So a manufacturer who chooses to build, for example, primarily larger vehicles, cars and trucks that are larger and heavier weight, will have a lower Corporate Average Fuel Economy estimate and similarly a higher—Ms. McCabe can speak to this—but similarly a higher carbon dioxide emissions.

Mr. TONKO. Thank you for expanding upon that because I know it was talked about a little earlier. But I think it is fair to say today's CAFE system is much more flexible than it was in the 1970s and it is not the case that all vehicles must meet a set standard. The standard will adjust based on market trends and other factors.

Can you explain how this flexibility helps both automakers and consumers?

Mr. HEMMERSBAUGH. Well, the flexibility means that automakers can produce and consumers can demand or purchase vehicles of the size and other parameters that they want when, if we go back in contrast to how it was before 2007, there was a single flat average. And so if you built more larger vehicles there would have to be, the manufacturer would have to compensate on the other side by building more smaller vehicles that got better gas mileage.

Today there are individual standards for each footprint of a vehicle, so that really advances consumer choice and manufacturer choice while at the same time ensuring that we have increasing stringency in the fuel economy standards year over year over year.

Mr. TONKO. Thank you. So if I am understanding this correctly, this will ensure that all models will get more efficient over time and that automakers can comply even if consumers are opting for larger cars or trucks.

Ms. McCabe, your testimony states that automakers are already ahead of schedule to meet standards for upcoming model years, and they are rapidly adopting technologies for greenhouse gas reductions. Did the TAR find that the targets for later model years can be met by mostly efficiency improvements to gas-powered engines?

Ms. MCCABE. Yes, it did. That there are technologies that are applied to advanced gasoline engines that will be the predominant pathways for automakers should they choose to go that way.

Mr. TONKO. OK. And, you know, one of the more encouraging findings of the draft TAR was that technological innovation has moved the whole process with our automakers. As automakers continue to innovate does new technology give them more flexibility in how they meet the standards?

Ms. McCABE. Oh, it certainly does. And this has been the triumph of the auto industry over decades in this country is that they continue to innovate and find new things and these standards go out 9 years ahead. And as the chairman mentioned before in talking about autonomous vehicles, we really don't know what everybody is going to invent between now and then, but we know they will because they always have.

Mr. TONKO. Right. So with challenges continuing, with certain technology outperforming the agencies' expectations, is it possible that some current model year vehicles may already be compliant with projected standards for model year 2020 and beyond?

Ms. McCABE. Oh yes, there are a number of model vehicles out there already complying with the 2020 year standards.

Mr. TONKO. Then, so what do you think this says about the automakers' ability to meet the standards with currently available technology?

Ms. McCABE. We think it is quite achievable based on the information that we have in the draft TAR. And as I have said, you know, we welcome everybody's views on that. But based on our information which is driven in a large part from our conversations with the automakers, because of course we have to be in very close communication with them, it is very encouraging.

Mr. TONKO. Well, I thank you. As I said earlier in my comments, America has always stepped up to challenges, and with the intellectual capacity that we bear as a nation I think we are up for challenges and we respond well with our pioneer spirit. With that I thank you and yield back.

Mr. BURGESS. The gentleman yields back. The Chair thanks the gentleman and the Chair recognizes the gentleman from Illinois, Mr. Shimkus, 5 minutes for questions, please.

Mr. SHIMKUS. Thank you very much, Mr. Chairman. I am over here. It is good to have you. You have already been probably told there are competing hearings, so we are bouncing back and forth. And it was easier when we are in the same building, but when we are in different buildings it takes a little bit longer.

So Ms. McCabe, I want to follow up on actually some of the questions. In your testimony you were talking about the hundred cars, SUV, pickup versions that meet 2020. Can you provide us three pieces of information to follow up? Data is important. And it is not adversarial, it is just to help us analyze.

What percentage of vehicle sales do those hundred cars, SUVs, and trucks represent so to get an idea of, you know, the market acceptance and those totals. What is the price differential versus the similarly situated cars, SUVs, and trucks because there is going to be a debate about how costly are cars and what is affordable.

How many of the hundred also meet EPA and NHTSA requirements by 2025? So we have got 2020 which you have addressed, but does any of these hundred meet 2025? And that would be help-

ful for us if you can provide us with that. And I know Mr. Hemmersbaugh is taking notes too, so however you can work on those.

Let me ask, has the EPA assembled any vehicles with the various technologies outlined in the draft Technical Assessment Report to see how they actually function in real-world driving conditions?

Ms. MCCABE. Well, we do have the ability to test out these technologies both by getting cars from manufacturers that have the technologies on them and then also working to build them in our lab as well. And part of the research that the automakers certainly do is to make sure that those technologies will be reliable, will last for many, many thousands of miles; that that is part of the routine QA and product development that the automakers do.

Mr. SHIMKUS. So you are getting that information from the automobile dealers. You are not doing any of that research on your own? So a lot of us, I remember driving in Colorado and stopping at a convenience stop and there was this pickup truck. It was dark. It was black. It was kind of covered up in fabric and they were driving it all over doing real-world testing.

Ms. MCCABE. Yes. Yes.

Mr. SHIMKUS. Which was then of course logos, no logos, all this top secret stuff—

Ms. MCCABE. Right, right.

Mr. SHIMKUS [continuing]. To get real-world conditions. So what we are trying to just ascertain is, is that information just coming from the industry, or are you all doing based on what you perceive to accomplish in the technical review are you testing real-world standards?

Ms. MCCABE. We do do testing, confirmatory testing ourselves to check the performance of these vehicles.

Mr. SHIMKUS. Because we found out our country is big and large and diverse and there is very, very cold and there is very, very hot and—

Ms. MCCABE. Absolutely. That is why our lab is in Michigan.

Mr. SHIMKUS. That is right. Ms. McCabe, while the CAFE and the greenhouse gas standards are affecting cars and light trucks, the renewable fuel standard is transforming motor fuels. Are there potential conflicts between these two programs, and if there are how can they be addressed?

Ms. MCCABE. I am sorry. Conflicts between—

Mr. SHIMKUS. The RFS which is kind of transforming the fuel mix—

Ms. MCCABE. Oh, the RFS. Sure.

Mr. SHIMKUS [continuing]. And you have greenhouse gas and you have CAFE, so we have got these different programs. Are there conflicts?

Ms. MCCABE. No, not at all. Not at all. The RFS was established by Congress to encourage the use of non-fossil fuels which are good for the climate, and this program encourages the more efficient and better fuel economy which will reduce greenhouse gas emissions. And in fact if automakers are building flexible fuel cars that can use renewable fuels, there is a provision in the greenhouse gas program to give credit for that. So they are complementary.

Mr. SHIMKUS. Right. So then, Mr. Hemmersbaugh, obviously one of the points of discussion will be how does a national program, how are you going to harmonize the agency standards when NHTSA and EPA have different credit-trading, credit transfer caps, and penalties for noncompliance? Are you all talking about this and trying to figure out how we are going to do this?

Mr. HEMMERSBAUGH. Absolutely. We have worked very closely with NHTSA and EPA as well as with the CARB to try to harmonize the standards to the best of our ability within our separate statutory commands. And NHTSA has some statutory requirements that we don't have flexibility to change, but we have worked hard to have a single set of standards that a manufacturer can meet by designing a single fleet that will comply with all the standards. And I misspoke. I didn't mean a single set of standards, I mean a harmonized set of standards.

Mr. SHIMKUS. Right. And I think—if I can just jump in, my time is running out—is that so there is a point being that to try to harmonize these there may be a need for some legislative change to help ensure that we actually have one set of standards that can harmonize, because it is our impression that you are handcuffed a little bit based upon current law. You have to do these certain things and you would need a legislative change to maybe be a little more flexible?

Mr. HEMMERSBAUGH. We absolutely would be happy to look at any proposed legislation, provide technical assistance, whatever we can do.

Mr. SLAVITT. Great, thank you. I yield back, Mr. Chairman.

Mr. OLSON [presiding]. The gentleman's time is expired. The Chair calls upon another Houston Texans fan, Mr. Green, for 5 minutes.

Mr. GREEN. Thank you, Mr. Chairman. And since we are talking about vehicles, both my truck and my cars have our Texas license plates on them. But I appreciate—and hopefully they will do very well tonight. And I am sorry my colleague from Massachusetts, Mr. Kennedy, is not here so we could have some fun.

I want to thank you for holding this hearing, because this is one of the first that we have had for a number of years and because we are in toward the end of the public comment period for the technical assistance. And I want to thank our witnesses before us today in providing the many perspectives we need to understand how this policy affects consumers, manufacturers, and the environment.

The program affords manufacturers significant flexibility in how to meet the standards. It also is important to make sure consumers have choices to get a vehicle that meets our needs. For example, on my every day in Houston, Texas, I use a Malibu that gets decent mileage, but sometimes we do have a little flooding in there so I use a Tahoe that probably gets ten miles less per gallon. So consumers need that choice too. Typically in Texas we have, I used to hear the Suburban was the national truck of Texas.

But one of the questions I have is that several witnesses on the second panel point out that EPA and NHTSA use different models to assess the technological feasibility and costs associated with these rules. My first question, does this hamper your ability to

align the standards for these programs if the two agencies use different vehicles, different models?

Ms. MCCABE. Well, I will start and if Mr. Hemmersbaugh wants to add he certainly can. We actually think that the two agency using somewhat different models is a strength of the program, and as the TAR reflects our results are right in line with one another for the most part. And it makes sense that the two agencies would have different tools that they would use, different methodologies that they would use.

All of this is information and material that we discuss widely with the industry and look forward to people's additional comments on it. But we think it actually strengthens the record for the findings that the agency will ultimately make.

Mr. GREEN. That is interesting because, you know, it seems like we would want to, both agencies would want to use, you know, the same model so they could, because they have different requirements for each agency to look at. But anyway, do the conclusions of your analysis differ widely?

Ms. MCCABE. No, they don't. Well, one way in which they do differ is the choices that each model makes about the least-cost ways for the automakers to be able to comply. And again I think that is a strength because it emphasizes that there are multiple pathways that automakers can choose. But when it comes to the ultimate conclusions about whether the technologies are available and the expected costs, the two analyses are quite well in line with one another.

Mr. GREEN. Before I get to my last question before my colleague from Illinois, Mr. Shimkus, leaves, I am not so sure the RFS is good for the climate, but that is the subject for a different hearing we will have to have sometime.

Mr. SHIMKUS. Well, ask the Administrator.

Mr. GREEN. My last question is, does the use of independent analysis strengthen your confidence in the information and assumptions of the underlying rules?

Ms. MCCABE. I certainly think it does.

Mr. HEMMERSBAUGH. I do too. And just getting back to your earlier question just to frame it slightly differently than Ms. McCabe, we believe that these two analyses are both robust and they are complementary and they allow for more comment on the different range of options. And that is what we are about right here in this midterm evaluation is putting out a lot of technical information and some different compliance options for the regulated community and other members of the public to comment on. So we think that is really a strength of the program.

Mr. GREEN. Well, and like I said, whether I am driving a Malibu or a Tahoe, over the years I have done that, and both vehicles have improved their gas mileage.

So Mr. Chairman, I will yield back. Thank you.

Mr. OLSON. The gentleman yields back. The Chair calls upon the gentleman from Texas, Mr. Barton, for 5 minutes, former chairman.

Mr. BARTON. Thank you, Mr. Chairman. I thank our two witnesses for being here this morning. I want to make a brief state-

ment since I didn't make an opening statement, then I will ask a question or two.

I personally think we could repeal the CAFE standards in their entirety. If there was a reason to have them back in the '70s and the '80s and the '90s, with gasoline prices where they are today I think the market could do it. So that is a subject for an entirely different hearing and we obviously need a new President. But you can make a good intellectual case to just repeal CAFE and let the market operate.

But since we have it we obviously have this mish-mash going on. We have got California's standards and EPA's standards and National Highway Transportation Administration standards, but theoretically they are all supposed to be working together and we are supposed to have what is called One National Program. I will ask each of you briefly, what is the status of this One National Program?

Ms. McCABE. I will start. We have one national program. The goal of the One National Program was that automakers would be able to build one fleet of vehicles that could be sold anywhere in the country, and they can. And the agencies work very, very closely together and we have and we will continue to do so, so that our programs are harmonized to the greatest extent feasible. And in fact they are harmonized to a very great degree, things like compliance testing and much of the obligations or flexibilities with respect to credits and that sort of thing are harmonized.

Mr. BARTON. The manufacturers don't agree that they are harmonized.

Ms. McCABE. Well, they have identified a handful of issues that they brought to us in a petition which we are considering, both agencies are considering them. And if there are other opportunities for us to improve the way the programs work together we certainly want to—

Mr. BARTON. What is NHTSA's take? Do you agree with EPA or do you have a little different opinion?

Mr. HEMMERSBAUGH. No, we generally agree with EPA that we are working hard to harmonize and to the greatest extent they can be harmonized we have done that. I can't comment on the pending petition right now, but I would except to note that automakers have presented a variety of different options for changing credits.

Mr. BARTON. Well, let me give you an example. These credits, both EPA and NHTSA use a credit program, right?

Mr. HEMMERSBAUGH. Correct.

Mr. BARTON. OK. The EPA credits last how long?

Mr. HEMMERSBAUGH. The EPA—well—

Ms. McCABE. Five years. Five years except for credits earned in the first phase of the program we extended their life.

Mr. BARTON. Well, I am told that NHTSA's credits last 5 years and the EPA credits last 11 years.

Ms. McCABE. Well, right. Our—

Mr. BARTON. So that doesn't look like harmonization to me.

Ms. McCABE. We had a one-time, as we transitioned from phase 1 of this program to phase 2 of this program we extended the length of credits earned during the first phase so that they last 11

years. But credits earned during the phase 2 of the program under EPA's rules last for 5 years. Does that clarify it?

Mr. HEMMERSBAUGH. So beginning in 2016—

Mr. BARTON. If I was listening exactly, I am sure it would clarify it. I kind of got lost in a daydream there. But do we agree that we at least ought to harmonize how long the credits last? Is that, or maybe you all agree that they are harmonized.

Mr. HEMMERSBAUGH. Yes, Mr.—

Mr. BARTON. Yes. Yes.

Mr. HEMMERSBAUGH [continuing]. Barton. They are harmonized beginning in 2016.

Mr. BARTON. OK. Well, the last question on that particular thing: Shouldn't the credits, whether they are harmonized or not, be used by both programs?

Ms. MCCABE. Well, we think it is important that both programs have a crediting system, which they do.

Mr. BARTON. OK. But the credit system is a little different. I am just saying, if we are going to have a program and you are going to try to harmonize it, let's call it apples and apples and have it comparable. That is all.

Mr. HEMMERSBAUGH. And we increasingly are harmonizing. We are getting to the point where most of the differences between the two programs are statutory and are things that we are not able to change without a change to the statute.

Mr. BARTON. So you are saying that there may be some things the Congress has to change the statute?

Mr. HEMMERSBAUGH. You could evaluate and determine whether that made sense, yes.

Mr. BARTON. Well, see, I want to repeal the whole program, so that makes the most sense to me. But we probably don't have the—you know, Ms. Schakowsky is rolling her eyes over there. If Mr. Trump is President, Ms. Schakowsky, we will be back. With that I yield back, Mr. Chairman.

Mr. OLSON. The gentleman yields back. The Chair calls upon the gentlelady from Florida, Ms. Castor, for 5 minutes.

Ms. CASTOR. Well, thank you, Mr. Chairman. First of all, I want to thank the National Highway Traffic Safety Administration. This summer you all came to Tampa. In fact, Dr. Mark Rosekind, the administrator, came himself and helped with outreach on child safety seats for many of my neighbors. He set up a whole section, a whole facility to make sure that folks know how to buckle in their kids and secure their seats, and highlighted the airbag recalls where it is especially important in a steamy, humid area like mine in the Tampa Bay area. So I really appreciate you doing that and highlighting the safercar.com Web site where people if they have questions about airbag recall they can go to get more information.

And I appreciate you calling this hearing. I think it is overdue. But CAFE standards are a great example of American ingenuity and innovation. They are really paying off for American families and businesses of folks we represent back home. And fuel economy and greenhouse gas emissions controls now are vital at a time when we must tackle the increasing costs of the changing climate, so we can't lose sight of that.

And I also appreciate all of the automakers, States, all of the environmental advocates coming together to make progress. And here at the end of the Obama administration, I want to say thank you to President Obama and everyone in the administration who has done a fabulous job for consumers when it comes to fuel economy.

Ms. McCabe, how much have American consumers saved since, over the lifetime of the CAFE standards program which was originally adopted in 1975?

Ms. MCCABE. Oh boy, I don't actually have that number for you, Congresswoman, but we can certainly see if we can come up with that. I mean it is clear that cars across the range of big, little, in between, are much more fuel efficient than they were 10 years ago, 20 years ago, 30 years ago. Just absolutely no question.

Ms. CASTOR. OK. Yes, please get that. And I bet a lot of the automakers and the advocates out there will have their estimates maybe on the next panel as well.

You have recently released a Technical Assessment Report and asked for comments. In what we know so far is automakers have exceeded expectations on the miles per gallon and fuel economy. Over the history of the program goals have been very important, they have helped everyone focus on higher mileage standards. So what do you think at this point? If they have exceeded expectations will you press for higher standards?

Ms. MCCABE. Well, of course we have not put out any sort of proposal with respect to the regulatory decision that we have to make. The stage we are at right now is putting out the technical information. So we won't opine on that until we issue a proposed determination after we have seen everybody's comments.

But I will say that the results to date are encouraging, and I would agree with you that goals are important to set. And I think when these standards were issued in 2012 with support from the industry, everybody recognized that they were challenging and that these were big challenges that we have to rise up to in this country and that people were up to doing it. But that is why we have this midterm review so that people can weigh in again.

Ms. CASTOR. And one of the remarkable developments lately is the fact that gas prices are so low. I never thought that we would see prices, in the Tampa Bay area prices have been hovering just above \$2 per gallon for many, many months. How does the fact that we have had these sustained low gas prices, how does that impact the technical review and the National Program for fuel economy?

Ms. MCCABE. Yes, it is clearly an issue of great interest in it, and as you say the prices, nobody expected them to be this low and we don't know what they will be 2 years from now, 4 years from now. Nobody knows, given the way they have gone up and down. So we want a system that is robust and anticipates all of those eventualities.

But it is the case that when gasoline prices go down people may choose larger cars because they are not feeling the cost of gasoline so much. However, no matter what car you buy and no matter what gas costs it is still better to pay less for it. And so a fuel efficient car even in a time of low gas prices is something that we know consumers care about.

Ms. CASTOR. Thank you very much, and I yield back.

Mr. OLSON. The biggest fan of the Houston Cougars in Florida yields back. The Chair calls upon the gentleman from Ohio, Mr. Latta, for 5 minutes.

Mr. LATTA. Thank you, Mr. Chairman, and thanks for our panel for being here. I appreciate it. And I think the gentleman from Illinois said a little bit ago we have two different hearings going on, so we are kind of shuffling back and forth, so I am sorry I missed your opening statements.

But if I could, Administrator, if I could start with my questions with you. When the EPA finalized the rule it granted multiplier incentives for electric vehicles, fuel cell vehicles, and natural gas vehicles. These incentives are useful to automakers in meeting the standards and encourages the production of these alternative fueled vehicles.

However, it did not extend these multiplier incentives to propane powered vehicles. This exclusion puts propane vehicles at a regulatory disadvantage compared to those from the other alternative fuels. Could you explain why the propane vehicles weren't given the equitable treatment by the EPA when the rule was finalized?

Ms. MCCABE. You know, Congressman, I wasn't intimately involved in the development of the 2012 rule, so I would like, if I could, to get back to you with a specific answer to that question.

Mr. LATTA. Yes, if you could, because that is important. And kind of following up with that, with the midterm evaluation underway will the EPA continue to examine the application of the multiplier incentives or other compliance incentives at this time?

Ms. MCCABE. Well, the charge in our rule is to look at the standards themselves in 2022 through 2025 and determine whether they are still appropriate or whether they should be made less stringent or more stringent. We will see what comment we get from people on the draft TAR, and of course carefully consider any input that we get as we make that particular regulatory recommendation.

Mr. LATTA. OK, because that is kind of following up on the second point. I just want to make sure then, because you would be willing then to reconsider the exclusion of the propane from the current incentives in order to bring parity to the alternative fuel marketplace?

Ms. MCCABE. Well, I can't speak to it specifically today, Congressman, but certainly will take your concern back to my team.

Mr. LATTA. OK. But if I could hear back from you I would appreciate that.

Ms. MCCABE. Sure.

Mr. LATTA. Mr. Hemmersbaugh, the NHTSA just released the proposed guidelines for autonomous vehicles earlier this week. In making the announcement, the secretary said that your agency would be conducting a number of public meetings around the country, which I support. I think that that kind of transparency and public engagement is important.

And one thing that would be tremendously helpful here would be if the NHTSA and the EPA would be willing to hold similar public workshops to review the Technical Assessment Report methodologies with technical experts. Especially given the significance of

TAR, would the agencies be willing to commit to holding a public workshop or a series of workshops?

Mr. HEMMERSBAUGH. As you may know, prior to publishing the TAR, we had a technical workshop, which we went through with all the experts and sort of walked through the technical concerns and features of the TAR. But we are—going forward, we are committed to getting as much public input as we can. We have, as you know, a comment period, but we are going to continue to take data and information in any way we can get it that we can reasonably accommodate it until we get to the proposed rulemaking for the NHTSA standard.

So I can't say today that we necessarily will do X and Y field hearings or anything like that, but it is certainly something that we are open to and will consider.

Mr. LATTA. Well, maybe we can communicate on that again because I think it is very, very important that that occurs.

Let me follow up. Throughout the TAR, the EPA and NHTSA use different inputs and assumptions. For example, the percentage of higher compression ratio naturally aspirated gasoline engine automakers are expected to deploy to meet the model year 2025 standards differs by about 43 percent. Similarly, the percent of the turbo-charge in downsized gasoline engines differs by about 21 percent and the percent of the stop-start technology differs by 18 percent. Can you explain how we have such a discrepancy in all the different percentages there that have come out?

Mr. HEMMERSBAUGH. I think no single reason explains, but there are several different reasons. One is that we use different models and those different models are each structured to the demands, the different demands of our statute. Another is that we use different inputs. As I was saying earlier, we use, we NHTSA, use the Argonne Labs' technology effectiveness model that then the outputs of that are the inputs to our CAFE model. EPA uses different models.

So there are inherent differences both in the inputs and in the way that the models treat those inputs for purposes of meeting our slightly different statutory obligations. Another reason I think that maybe have some, account for some of the difference is that NHTSA used a different baseline year than EPA did. We used a 2015 baseline year and EPA used a 2014 baseline year. So that accounts for some of the differences as well.

But the main thing I would like to emphasize is that this provides a range of different options that people can look at, that commenters and look at and tell us where we are getting it right, where we are getting it wrong and what adjustments can be made. So this sort of, you know, array of different options is really a benefit to the commenting community.

Mr. LATTA. Well, thank you very much, Mr. Chair. My time is expired and I yield back.

Mr. OLSON. The gentleman's time is expired. The Chair calls upon the gentleman from New York, Mr. Engel, for 5 minutes.

Mr. ENGEL. Thank you, Mr. Chairman. I want to thank the witnesses. You can see there is a lot of interest here. We have had a lot of members here. I have a few questions I am going to try to move on fast.

Implementation of CAFE standards has been happening alongside the recovery of the auto industry. In 5 years into this implementation new vehicles are significantly more fuel efficient, consumers are buying automobiles at a record pace, and U.S. automakers have made a dramatic return to profitability. So aren't the standards working as proposed, even though my friend Mr. Barton wants to repeal the whole program? Aren't these working as proposed?

Ms. MCCABE. Well, we think they are, given the number of additional models that are available for customers to buy that get increasing fuel economy.

Mr. HEMMERSBAUGH. Yes, we at the Department of Transportation and NHTSA believe they are working well and as intended.

Mr. ENGEL. Thank you. In the past few years we have seen substantial new technologies come to market including advanced engines, improved transmission systems, light weighting of vehicles and more efficient tires. Do you think that the relaxation of CAFE standards would stifle additional advancements?

Ms. MCCABE. Well, I think that the standards do provide a goal and a challenge to the manufacturers, and I think that that kind of goal and expectation has been helpful to drive innovation over years in the auto industry as well as other industries. So I think it is important to have reasonable and achievable but ambitious standards given the stakes here, which is fuel economy, consumer choice, cost and the impact that greenhouse gases are having on our environment.

Mr. ENGEL. Mr. Hemmersbaugh, do you agree?

Mr. HEMMERSBAUGH. I agree.

Mr. ENGEL. I agree. OK. I have been an advocate for many years of increased production of flex-fuel and alternative fuel vehicles. When car makers sell flex-fuel vehicles that are built to run on either gasoline or E85, they earn credits that help them to comply with the CAFE requirements.

Can you explain how that works and share your thoughts on whether we should continue these credits, because only about two percent, I am told, of gas stations in the U.S. sell E85 so most flex-fuel cars run on gasoline and don't generate the intended benefits because they can't get it. Can we remedy that? Should we, and if so, how?

Ms. MCCABE. Yes. So there is a provision in the rule as you identify for flex-fuel vehicles to get credit in the calculation of fuel economy, and EPA keeps a watch on the very issue that you identify which is how often are those vehicles actually driving on E85. And we have the ability to adjust the credit that is currently in the rule to reflect real-world conditions.

As we discussed earlier, we have this complementary program, the Renewable Fuel Standard, the major purpose of which is to try to increase the availability of renewable fuels including E85. And so there are significant efforts that not only EPA but USDA and others are putting into that effort. The more that that is successful, the more we will see these flex-fuel vehicles actually operating on E85 and the CAFE standards and the GHG standards can accommodate that.

Mr. ENGEL. Thanks so much. Let me see, in 2012 it was widely reported that about 60 percent of vehicle sales would be cars and 40 percent would be trucks and these numbers seem to have flipped, so it is now 60/40 the other way. Does that consumer choice impact industry's ability to meet their CAFE standards?

Mr. HEMMERSBAUGH. No. Because the standards are designed based on the footprint of the vehicle, every size of vehicle has its own fuel economy target. So the manufacturers' mix of vehicles—and say that they are as you suggest. Our numbers suggest more like 50/50, light vehicles and, or trucks and light cars, but whatever the percentage is, the beauty of the standards is that each size of vehicle has its own fuel economy standard, so there is no need to have some corresponding offset in high fuel economy for small vehicle if they are building more larger vehicles.

So that is really an important, and as Ms. McCabe said, ingenious innovation of the 2007 EISA statute to provide that we use these footprint standards.

Mr. ENGEL. Thank you. My last question is that CAFE standards are often linked to the 54.5 mile per gallon projection, but that is not even close to the miles per gallon estimates that will be pasted on the windows of new cars in showrooms, let alone the fuel economy that drivers would experience on the road. Instead, the calculations take into account adjustments and credits for things like electric cars, flex-fuel vehicles, energy-efficient air conditioning, and rooftop solar panels. So the result is the 54.5 mile projection is the equivalent of about 37 to 40 MPGs on the sticker.

So I am hearing arguments that additional CAFE credits should be awarded to the auto industry for safety improvements such as autonomous braking which in theory will prevent accidents, reduce congestion, and thus save energy and emissions. What are your thoughts on that?

Ms. MCCABE. This is an issue that we are certainly hearing about. I don't think we feel like the data are sufficiently robust to make decisions on this right now, but encourage and invite everybody to continue to look at that.

Mr. HEMMERSBAUGH. I would just add that with respect to any proposals to change a program we would keep in mind our overarching goal of fuel conservation, and we would view with some skepticism any credit system or other changes to the program that could undermine the gains that we have had in fuel economy.

Mr. ENGEL. Thank you. Thank you, Mr. Chairman.

Mr. OLSON. The gentleman's time has expired. The Chair calls upon the gentleman from the Commonwealth of Virginia, Mr. Griffith, for 5 minutes.

Mr. GRIFFITH. Thank you very much, Mr. Chairman. I appreciate you all being here today. Acting Administrator McCabe, my constituents tell me that the joint EPA–NHTSA rulemaking published in August imposes the compliance burden on the manufacturers of truck trailers to achieve reductions in greenhouse gases. Is that correct?

Ms. MCCABE. So you are speaking of the heavy-duty rule that we published this summer.

Mr. GRIFFITH. Yes, ma'am.

Ms. MCCABE. And it does address a variety of aspects of trucks that can contribute to lower greenhouse gases, including trailers.

Mr. GRIFFITH. OK. And so that brings my first question. The legal authority defines, that gives you all the right to do this on motor vehicles, defines motor vehicles to mean, and I am going to read from 42 USC 7550 paragraph 2. The term motor vehicle means any self-propelled vehicle designed for transporting persons or property on a street or highway.

So recognizing that trailers are not self-propelled, they are not a part of the heavy truck; they are added to the heavy truck after the manufacture of the heavy truck, from whence comes your legal authority to regulate trailers?

Ms. MCCABE. Well, Congressman, we lay out our response to those comments and our legal analysis at great length in the rule, but I will tell you that without a trailer a truck is not transporting goods. And so we see the trailer as an integral part of the vehicle that is covered in the Clean Air Act.

Mr. GRIFFITH. And you and I are going to have these disagreements for years because we just see things differently and I recognize that. But in all due respect, one of the principles of law, and I understand that you are not an attorney and I am not—

Ms. MCCABE. I am, actually.

Mr. GRIFFITH. Oh, you are an attorney. OK. Well, there you go. One of the principles is—I was giving you credit. One of the principles is, is you go with the plain meaning of the words when Congress writes a statute. “Motor vehicle” means any self-propelled vehicle designed for transporting persons or property on a street or a highway.

It would be my opinion, and I think based in well-settled law, that if you wanted to include trailers, you should have asked for an amendment to the code section as opposed to deciding on your own at the EPA, well, we see the truck can’t be used without a trailer to haul goods, therefore we are going to make a determination. That is our job. And respectfully, you are not elected by folks. That is our job to make that decision.

And maybe it is the right decision, but it is something that we should have decided as opposed to the EPA just deciding to rewrite the words in the code section. And so I find it very difficult to rectify. And while you may have a very lengthy clarification on how you get to that point, the plain meaning of the words are motor vehicle means any self-propelled vehicle designed for transporting persons or property on a street or highway. A trailer doesn’t do anything.

Furthermore, the manufacturers of those trailers are not in most cases, I don’t know of any but maybe there are some, they are not the truck manufacturers. So they are completely different entities across the board. And I am not talking about wholly owned subsidiaries or anything like that. They are completely different companies. And so a person can go out and buy their truck from one of the manufacturers and then they can go buy their trailer from any number of manufacturers. And so I am having a hard time figuring out how you all came to that conclusion.

Furthermore, and for many of my colleagues who may not be aware of it, there is a SmartWay program where you all encourage

folks to do things on trailers and the SmartWay is currently voluntary, but appears from this new ruling that has come out that you all are making the SmartWay program mandatory. The problem that I have with that, Acting Secretary, is that helps on trucks that are going to be hauling across the highways, but it does not help in those situations where, which I am told about half of the trucks that are out there hauling things are in local traffic, sometimes congested areas, these additional costs and extra weight added to the truck by the SmartWay program which appears to now going to be basically mandatory, they don't give you any fuel efficiency for those trucks that are hauling things in a local setting.

Now if you are on the interstate highway they clearly give you benefits and the SmartWay program is beneficial to the truckers. What do you say to that? Why does it have to apply to every trailer that is sold out there when you have got a lot of folks who don't want it to go that direction because it is not going to save them any fuel efficiency or give them any benefit?

Ms. MCCABE. Well, Congressman, of course I am not sure where you have concluded that the rule made the SmartWay program mandatory because it certainly doesn't. The rule sets expectations and standards for a large range of different kinds of trucks and it is very detailed and diverse based on the kinds of trucks. And we looked exactly at that question. Different standards are appropriate for vehicles that are on the highway operating at high speed, most of the time driving many, many miles, and other standards and other technologies are appropriate for vehicles that are used in urban settings and on smaller roads and stop and start and that sort of thing.

So I think you will find, and I think the manufacturers find that we have been very responsive to exactly those sorts of things and have not made the SmartWay program mandatory.

Mr. GRIFFITH. OK. That is not what I am hearing. My time is up. I would say though that if you are talking about the averaging features that that doesn't kick in for years and a lot of the smaller manufacturers feel like they are going to have some real difficulties.

With that Mr. Chairman, because time is up and notwithstanding lots of other questions, I yield back.

Mr. BURGESS [presiding]. The gentleman yields back. The Chair thanks the gentleman for his questions and recognizes the gentleman from Texas, Mr. Flores, 5 minutes for questions, please.

Mr. FLORES. Thank you, Mr. Chairman, and I appreciate the witnesses joining us today. We talk about One National Program, and we have had questions regarding the harmonization efforts that we have talked about. And as I have listened to the testimony and reviewed the briefing documents, it seems to me like there are four principal differences that keep us from absolute harmonization.

So the first principal is with respect to the credit carryovers—5 years for NHTSA, 11 years for the EPA. The second one is the carryover transfer cap which allows a manufacturer to transfer part of their credits from one fleet to another, for instance, cars to light trucks and vice versa. For NHTSA there is a cap of 2 miles per gallon per year. EPA has no such cap.

Then the third one has to do with off-cycle technologies, for instance start-stop technology, engine start-stop technology, louvers and things like that which are all pretty innovative. The EPA allows credits beginning in model year 2014, however, NHTSA is not going to start recognizing those until 2017. And then the fourth difference is that the California Air Resources Board is requiring that 15 percent market penetration of zero-emissions vehicles by 2025, and there is no such standard for Federal.

Do you all agree with those four principal impediments to harmonization, complete harmonization? I know you were writing real quickly.

Ms. McCABE. Yes. Let me address the last one that you mentioned.

Mr. FLORES. And I need really quick answers.

Ms. McCABE. Yes. So there is no disharmonization there. California has independent authority and has had a ZEV program for many, many years because of their air quality problems in California. But vehicles sold in California can absolutely satisfy requirements under the EPA and the NHTSA program.

Mr. FLORES. OK. So do both of you agree then the other three standards prevent Federal harmonization? Does that make sense?

Mr. HEMMERSBAUGH. I would like to qualify that a little bit.

Mr. FLORES. OK.

Mr. HEMMERSBAUGH. The credit lives as of 2016 for both EPA and NHTSA are 5 years.

Mr. FLORES. OK.

Mr. HEMMERSBAUGH. It was only sort of a catch-up in the start that EPA had 10- and 11-year credits. Those will all expire by 2020.

Mr. FLORES. OK. But there is no statute that requires EPA to limit theirs to 5 years, right?

Ms. McCABE. No. That is a regulatory matter, but they are the same age now.

Mr. FLORES. OK. OK, NHTSA's are 5 years by statute. EPA has no statute, correct? OK, so to the extent that Congress wants to harmonize, Congress needs to come up with a statute on that issue. The second one has to do with the carryover transfer cap. NHTSA's, by statute yours is two miles per gallon per year, right?

Mr. HEMMERSBAUGH. Correct.

Mr. FLORES. OK. And EPA no cap, correct?

Ms. McCABE. Across vehicles?

Mr. FLORES. Correct.

Ms. McCABE. Correct.

Mr. FLORES. Across fleets.

Ms. McCABE. Yes.

Mr. FLORES. Or from one fleet to another.

Ms. McCABE. Right. That is right.

Mr. FLORES. OK. So if we want to harmonize that that is going to require legislative action and an update to the statute. And then lastly, on the off-cycle technologies, I don't gather that there is any statute that regulates that, that addresses this issue, right?

Mr. HEMMERSBAUGH. My understanding of off-cycles is that they are things that the tests don't measure, the treadmill tests that we test for don't measure.

Mr. FLORES. Right.

Mr. HEMMERSBAUGH. But do contribute to fuel economy and greenhouse gas reductions. So my understanding is there are, the statute, the NHTSA statute anyway is silent on that.

Mr. FLORES. Right.

Mr. HEMMERSBAUGH. And we had previously——

Mr. FLORES. Which means there is no statute.

Mr. HEMMERSBAUGH. Yes. Well, but we had previously interpreted that as meaning we weren't authorized to do it. We subsequently changed our interpretation such that now starting in 2017 we will consider off-cycle credits.

Mr. FLORES. All right. Ms. McCabe.

Ms. MCCABE. Yes. So our statute requires a two-cycle test, but it does not preclude the use of off-cycle credits.

Mr. FLORES. OK. So to entirely harmonize these we would need legislative action. All right. So I think we know what our job is now in terms of Congress coming up with a legislative fix for these three principal areas of harmonization.

I have a quick question. You talked about E85 vehicles a minute ago. E85 fuel has fewer BTUs of energy per gallon and therefore the vehicles that are burning E85 get about a third lower miles per gallon. So what is the emissions impact? I know that some people claim ethanol has a lower emissions profile than vis-a-vis gasoline, but how much of that is offset by the fact that you are getting one third less miles per gallon?

Ms. MCCABE. When it comes to greenhouse gases, the research that the agency has done to date on this program shows that there is a benefit. There is a carbon benefit in using E85.

Mr. FLORES. So if you are burning 20 gallons of ethanol you have a lower greenhouse gas output than 12 1A½ gallons of gasoline. Is that what you are telling me?

Ms. MCCABE. I believe that is right, Congressman. We will double——

Mr. FLORES. Can you supplementally answer that?

Ms. MCCABE. Absolutely.

Mr. FLORES. And some of the statistics, too. I want to see the test.

Ms. MCCABE. Sure. Yes.

Mr. FLORES. And I have used up too much of my time, so I am going to stop. Thank you.

Mr. BURGESS. The gentleman yields back. The Chair thanks the gentleman. Seeing no further members wishing to ask questions of the first panel, I do want to thank our witnesses for being here today. This will conclude our first panel, and we will take a very, very brief recess to set up for the second panel. Thank you for being here today.

[Recess.]

Mr. BURGESS. We will call the committee back to order. We may still be waiting on one witness to join us, but in the interest of everyone's time, why don't we go ahead and restart. I do want to thank everyone for their patience in being here today.

Moving into the second panel for today's hearing, we will follow the same format for the first panel. Each witness will be given 5 minutes for an opening statement followed by a round of questions

from members. For our second panel we have the following witnesses. You reversed order on me.

We have Mr. Mitch Bainwol, the President and CEO of the Alliance of Automobile Manufacturers; Mr. Peter Welch, President of the National Automobile Dealers Association; Dr. John Graham, Dean of the School of Public and Environmental Affairs for Indiana University; Mr. John German, Senior Fellow, U.S. Co-Lead, the International Council on Clean Transportation; Dr. Mark Cooper, Director of Research from the Consumer Federation of America; and Mr. John Bozzella, President and CEO of the Global Automakers.

We will go in reverse order. We will start with you, Mr. Bainwol, 5 minutes for questions.

STATEMENTS OF MITCH BAINWOL, PRESIDENT AND CEO, ALLIANCE OF AUTOMOBILE MANUFACTURERS; PETER K. WELCH, PRESIDENT, NATIONAL AUTOMOBILE DEALERS ASSOCIATION; JOHN D. GRAHAM, PH.D., DEAN, SCHOOL OF PUBLIC AND ENVIRONMENTAL AFFAIRS, INDIANA UNIVERSITY; JOHN GERMAN, SENIOR FELLOW AND PROGRAM DIRECTOR, INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION; MARK COOPER, PH.D., DIRECTOR OF RESEARCH, CONSUMER FEDERATION OF AMERICA; AND JOHN BOZZELLA, PRESIDENT AND CEO, ASSOCIATION OF GLOBAL AUTOMAKERS, INC.

STATEMENT OF MITCH BAINWOL

Mr. BAINWOL. Chairman Burgess, Ranking Member Schakowsky, and members of the committee, thank you for this opportunity to testify today on behalf of 12 iconic OEMs from the U.S., from Europe, from Japan, who together represent about 75 percent of the domestic market. Automakers are investing a staggering \$100 billion a year—that is \$100 billion with a B—to make today's cars the cleanest, safest, the most fuel efficient ever.

Let me start by stipulating that we support the goals of increased CAFE and GHG standards and believe they will be achieved and ultimately surpassed. The question isn't yes or no, but rather how, when and at what cost to your constituents. OEMs strongly embrace two cornerstones of the 2012 joint rule. First, we supported the common sense idea of a midterm review to ensure that the underlying assumptions remain valid, and that is critical given the time horizon involved.

Second, we embrace the administration's commitment to One National Program to minimize compliance costs and thereby help your constituents buy new cars. Now this is the TAR, this double binder is double-sided. It is obviously very long and very dense. This is the portion of the TAR that addresses consumer acceptance. It is short and, as you can see, not very dense, and that is a concern for us.

The most critical fact about CAFE that it is effectively a mandate on consumption. It doesn't matter what we put into the showrooms, it matters what your constituents take out of those showrooms. Critically, CAFE was launched with an expectation of higher gas prices and it is being played out in a world of structural lower gas prices. That impacts consumer choice and is a game-changer.

This first graph that I think you can see on the screens illustrates the materiality of the gap. You can see the gap is consistent over time and very large, so that in 2025 in 2010 dollars the expectation was 3.87 and now the expectation is 2.76. This next graph shows what happens to the purchase of alternative powertrains when gas prices fall. It kind of looks like synchronized swimming.

And you see in the third graph that the market share of alternative powertrains is therefore sliding down. The regulators in Washington and in California want consumers to optimize. They want them to optimize fuel efficiency and carbon reduction, but consumers are making decisions that reflect a range of other priorities that are right for their families.

So this next slide shows where fuel efficiency ranks, and there you go. And it is kind of hard to see, but it is item number 26 in the strategic vision assessment of 2016. Consumers are not saying the fuel efficiency isn't good or desirable, they like it. They are saying instead that they care about a range of attributes. And your constituents are not wrong. They are doing what is right for them, but they are not doing what planners want them to do.

Now let's turn to One National Program. The short story is that it doesn't exist. There are now two separate consumption mandates, CAFE and ZEV. ZEVs run out of California and nine other States follow it. By 2025, the ZEV mandate effectively places a \$356 tax on every car sold in America. This is important. It means California policy is raising the cost of every car your constituents buy in all of your districts.

And the Federal program contrary to assurances is not harmonized. Complying with the more stringent EPA requirements does not equal compliance with NHTSA, thus counterproductively adding regulatory costs making cars less affordable and that especially hurts lower income Americans. It needs to be fixed sooner rather than later.

To close, getting all this right really matters. If we jam standards that are inconsistent with consumer behavior we risk jeopardizing the health of this key industry leading to thousands of job losses, if not more, diminishing environmental gains and safety outcomes. We have to keep cars affordable to protect these social goals.

Now I want to make one other point here since I have a little bit more time. The Center for Automotive Research released a study yesterday and it was significant in terms of it demonstrates that there is a risk to getting this equation wrong. As I understand it, the EPA and NHTSA analysis of the TAR analysis did not do a sensitivity analysis.

What CAR did was they looked at nine different scenarios, three different gas prices, and three different costs estimates of the technology, and they ran the nine different scenarios. And they looked at what happens in terms of employment, sales, production, and it is kind of striking.

Let me take a second and run through the range. Unit sales could rise by 410,000 or fall by as much as 3.7 million. Production could rise by 240,000 or fall by as much as 2.1 million units. Auto employment could rise by 16,000 or fall by 138,000, and with the multiplier in employment, employment could rise by 144,000 or fall

by over a million jobs. That is in Michigan, it is Ohio, it is Texas, it is California, it is Illinois.

This is profoundly important because it demonstrates that if we get this equation wrong, the implications for the economy are truly profound. Thank you and I look forward to answering questions.

[The prepared statement of Mr. Bainwol follows:]



AUTO ALLIANCE
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STATEMENT

OF

THE ALLIANCE OF AUTOMOBILE MANUFACTURERS

BEFORE THE:

**ENERGY AND COMMERCE COMMITTEE
SUBCOMMITTEE ON COMMERCE, MANUFACTURING, AND TRADE
AND THE SUBCOMMITTEE ON ENERGY AND POWER
U.S. HOUSE OF REPRESENTATIVES**

**HEARING TITLE: MIDTERM REVIEW AND AN UPDATE ON THE
CORPORATE AVERAGE FUEL ECONOMY PROGRAM AND
GREENHOUSE GAS EMISSIONS STANDARDS FOR MOTOR VEHICLES**

SEPTEMBER 22, 2016

PRESENTED BY:

Mitch Bainwol
President and CEO

Summary

The Alliance appreciates the opportunity to offer our views on the Midterm Evaluation (MTE) of Model Years 2022-2025 GHG and CAFE Program Standards for light-duty vehicles. It is imperative that policymakers, stakeholders, and the public utilize this MTE process to examine the assumptions that shaped the 2012 rulemaking.

The Alliance believes more technical work needs to be done, both in more accurately projecting the level of technology that will be required for compliance and in developing an understanding of consumer acceptance of those technologies, before the agencies move forward with a proposed determination or NPRM.

Automakers have sped the deployment of new fuel-efficient models in an effort to meet the aggressive standards. The question isn't whether automakers will continue to do so but rather how and by when? The agencies claim that the requirements can be met primarily with more efficient gas-powered vehicles and minimal electrification. Yet, studies clearly disagree and find that the standards can't be achieved without significantly higher sales of alternative powertrains – such vehicles accounted for less than 3% of all light duty vehicles sold in the U.S. last year.

The agencies largely ignore this consumer acceptance dilemma, devoting only 27 pages to the topic in the 1,200-page Draft TAR. Adoption of alternative powertrains hasn't lived up to expectations despite a 174% increase in such models being available to consumers since 2010. This is likely to continue in a low gas price environment.

Additionally, the Draft TAR doesn't fully examine consumer affordability. If consumers have difficulty affording the cost of new technologies required for compliance, they may hold onto their current vehicles longer, disrupting the "virtuous cycle" of fleet turnover that enables safer and more fuel-efficient vehicles on the roadways.

Unfortunately, the principle of "One National Program" (ONP) has not materialized as harmonization gaps remain and will increase in the future. It still amounts to three separate programs that are managed by three separate agencies. Compliance with one federal program does not guarantee compliance with all. These discrepancies are creating immediate problems that must be addressed now, outside of the MTE process.

Also creating direct conflict with One National Program are the actions of California, which is moving forward with a different schedule on the MTE process and proceeding with their costly ZEV mandate – adopted by CA and nine other states. The mandate requires automakers to sell enough ZEVs to reach at least a projected 15.4 % of total sales in each ZEV state. It provides no net GHG benefit but adds significant compliance costs for consumers nationally.

The agencies estimate the cost of ONP to be about *\$200 billion* from 2012-2025. A failure to take marketplace realities into account could result in unintended consequences consumers, industry, and society as a whole.

Testimony

On behalf of the 12 members of the Alliance of Automobile Manufacturers (Alliance), thank you for the opportunity to testify today on the Midterm Evaluation (MTE) of Model Years (MY) 2022-2025 Greenhouse Gas (GHG) and Corporate Average Fuel Economy (CAFE) Program Standards for light-duty vehicles. Alliance members account for 75 percent of annual car and light truck sales by revenue in the United States. The Alliance includes amongst its diverse membership companies headquartered in the U.S., Europe and Asia, including the BMW Group, Fiat Chrysler Automobiles US, Ford Motor Company, General Motors Company, Jaguar Land Rover, Mazda, Mercedes-Benz USA, Mitsubishi Motors, Porsche, Toyota, Volkswagen Group of America and Volvo Car Group.

By creating jobs, fueling innovation, driving exports, and advancing mobility, automakers are driving the American economy forward. Nationwide, eight million workers and their families depend on the auto industry. Each year, the industry generates \$500 billion in paychecks, and accounts for \$205 billion in tax revenues across the country. Historically, the auto industry has contributed between 3 - 3.5 percent to America's total gross domestic product. No other single industry is linked to so much of U.S. manufacturing or generates so much retail business and employment.

Background

This hearing comes at a pivotal time for our industry. In 2011, NHTSA and EPA, in collaboration with the California Air Resources Board (CARB), established fuel economy and

greenhouse gas targets for MY 2017-2025 via its “One National Program” (ONP)¹. A key reason the automakers entered this agreement was that the agencies pledged to conduct a Midterm Evaluation of longer-term standards for MY 2022-2025 to consider whether fundamental assumptions made several years ago continue to be realistic for those years or if those assumptions should be changed or adjusted. The agencies have recently started this process by issuing a Draft Technical Assessment Report (Draft TAR) on July 18, 2016. A proposed determination on the appropriateness of the regulations for MY 2022-2025 is expected in 2017 and a Final Determination must be made by April 2018. The agencies have provided a 60-day public comment period through September 26, 2016 regarding the Draft TAR.

Just over four years ago, the goals set forth in One National Program were ambitious – setting an aggressive fleet-wide projected average target in the EPA program of 54.5 MPG by MY 2025. **The first phase of the One National Program has already yielded significant progress and automakers remain committed to continued improvements. However, it is imperative that policymakers, stakeholders, and the public utilize this Midterm Evaluation process to examine those factors and assumptions that shaped the joint rulemaking that was finalized in 2012 and evaluate the technical merits underpinning the ONP.** Much has changed in four years – most notably, fuel prices and changes in consumer purchasing habits. These changes are important to keep in mind because automakers are ultimately judged not by what they produce but by what consumers buy. **A failure to take these marketplace realities into account could**

¹ One National Program covers two phases: one covering Model Years 2012-2016 and the other covering MY 2017-2025. Both phases are commonly referred to as “One National Program.”

result in unintended consequences for society as a whole. Especially important to this Committee and Congress is a full appreciation for how certain regulatory requirements may impact not just the auto sector but consumers, businesses and the broader economy when it comes to the ability of consumers to purchase newer automobiles that are more fuel efficient and safer than vehicles that are on the roadway today – which average just over 11 years old.

Draft Technical Assessment Report

The Draft TAR is intended to be the first formal step in the MTE process. In the Draft TAR, the agencies examined a wide range of technical issues, relevant to GHG emissions and augural CAFE standards for MY2022-2025. The release of the Draft TAR is the first chance for the public to formally comment on the MTE process and the feedback from which will enable the agencies to address any technical issues before moving on to future policy decisions. On August 1, 2016 the Alliance and several stakeholders requested an extension of the comment period of no less than 120 days. This technical report spans more than 1,200 pages and incorporates the findings of 1,099 studies. Additionally, some of the supporting documents and analyses were not available for public review at the beginning of the comment period. We strongly contend that the current 60-day timeframe is not nearly long enough for a comprehensive review of this information.

On August 22, 2016, EPA and NHTSA denied the requested extension, arguing that the 60-day comment period is appropriate. In their response, the agencies, among other things, noted that the Draft TAR was “publicly released nine days before the publication of the Federal Register

notice on July 27th.” These additional nine days hardly justify a denial for a reasonable extension of the comment period and raise concerns about the agencies repeated assurances of a “collaborative, robust and transparent process.”

The Alliance believes considerably more technical work needs to be done, both in more accurately projecting the level of technology that will be required for compliance and in developing an understanding of consumer acceptance of those technologies, before the agencies move forward with either a proposed determination or NPRM. The Draft TAR largely ignores consumer acceptance (a 27-page chapter in a 1,200-page document) and contains several technical and modeling errors that lead to an overly optimistic view of both technology effectiveness and cost to manufacturers and ultimately consumers. Thus, the Alliance continues to conduct an extensive review of this vast technical report and currently expect it will be necessary to submit additional comments after the September 26th deadline. We hope the agencies will fulfill their commitment to continue to consider new data and information after the approaching deadline and, specifically, we look forward to working with the agencies to better inform the MTE by improving agency modeling efforts as well as understanding the challenges related to consumer acceptance.

Throughout the Draft TAR, the agencies correctly point to the significant fuel economy gains that automakers have made across the light-duty vehicle fleet. Indeed, automakers have made tremendous strides in vehicle fuel-efficiency and continue to drive innovation. The auto industry invests more than \$100 billion annually in research and development to improve vehicle fuel economy and safety, and this investment is paying off as vehicles on the road today are safer, cleaner, and more fuel-efficient than ever before.

Automakers have accelerated the development of new fuel-efficient models in both conventional and alternative powertrains in an effort to meet future targets and consumer demand. According to www.fueleconomy.gov, the government's source for fuel economy information, the number of models achieving EPA label ratings of 30+ MPG highway fuel economy has grown by over 700 percent since 2006, while the number of models achieving 40+ MPG has increased tenfold over the same period. By MY 2015, light-duty vehicles included 46 models of hybrids (HEVs), 18 battery electric models (BEVs), and 12 plug-in hybrids (PHEVs), in addition to hundreds of new high MPG internal combustion offerings.

Looking ahead, the question is not whether automakers will continue to innovate and implement technologies to improve fuel economy and reduce GHG emissions but rather how will automakers meet the aggressive standards currently in place, by when and at what cost to consumers, industry and the economy as a whole? The ONP requirements assume fuel economy gains of about 5 percent per year for cars and about 3.5 percent per year for trucks during the MY 2012-2021 portion of the program. The final four years of the program (MY 2022-2025) impose an expectation of fuel economy gains of about 5 percent per year for both cars and trucks. To understand the magnitude of this challenge, *WardsAuto* looked at the improvements needed in each vehicle category. They concluded that fuel economy targets must increase by 30 percent between MYs 2014 and 2021 and 57 percent between MYs 2014-2025.² This steep increase especially affects light trucks, which must improve mileage by 34 percent

² 2015 WardsAuto Fuel Economy Index

between MY 2014-2021 and 61 percent between 2014-2025.³ This is especially important to keep in mind when you look at the consumer purchasing habits in MY 2015 where approximately 57.3 percent of consumers purchased cars and 42.7 percent of consumers purchased trucks or SUVs.

More Electrification will be Necessary

In the Draft TAR, the agencies express optimism that automakers can continue to meet the aggressive requirements primarily with more efficient gasoline-powered vehicles and with minimal levels of electrification. However, the Alliance strongly believes that current facts, including consumer preferences, undermine such a conclusion. One way to assess the agencies' expectations is to examine what percent of MY 2015 vehicles meet future CO2 emission targets. The results are revealing when it comes to future compliance. Less than 4 percent of current models meet MY 2021 targets, and the sales of these most fuel-efficient vehicles remain extremely low.⁴ Currently, *no* diesel or gas-powered (non-hybrid) vehicles make the MY 2025 targets.⁵ The agencies have repeatedly stated that compliance with the MY 2025 standards will not require significant hybridization or electrification, but that clearly seems to reflect a leap of faith that transcends current technology realities.

³ Id.

⁴ U.S. EPA, "Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 through 2025"

⁵ Id.

A recent analysis by Novation Analytics (Novation) that relies on EPA and NHTSA data further illustrates this disconnect. Novation found that automakers will need to apply more, costlier technologies than was initially predicted to meet projected ONP targets, and that the post-2021 standards cannot be achieved without significantly higher sales of advanced technology vehicles, including HEVs, PHEVs and BEVs.⁶ Novation concludes, “Moving the entire industry to the current best spark-ignition powertrains would provide compliance only to MY 2020. Advanced SI technologies, unproven in production, and/or high rates of electrification will be required by MY 2025.”⁷

Additionally, a study published in June by the World Energy Council estimates that larger volumes of battery electric vehicle sales will be needed to plug an "EV Gap" between fuel economy targets and the improvements that can be realistically expected from traditional gasoline-powered engines.⁸ In the U.S., that translates to 0.9 million cars, or 11 percent of estimated 2020 new car sales. This represents a dramatic increase from the 70,823 BEVs that were sold in 2015.⁹

⁶Novation Analytics, Technology Effectiveness – Phase 1: Fleet-Level Assessment” (October 19, 2015), available at <http://www.autoalliance.org/index.cfm?objectid=CBB15950-3985-11E6-85D0000C296BA163>

⁷Novation Analytics Technical Briefing: Trade Association Studies; Powertrain Technology Effectiveness, Phase II”, prepared for the California Air Resources Board (May 17, 2016), available at <http://www.autoalliance.org/index.cfm?objectid=E4513660-3985-11E6-85D0000C296BA163>.

⁸ World Energy Council in collaboration with Accenture Strategy, “World Energy Perspectives 2016 Report on E-Mobility”

⁹ 2015 Ward’s Automotive

This stark contrast in the levels of electrification necessary to meet the aggressive standards versus actual sales of electric vehicles highlights the daunting challenge automakers currently face due to the nature of One National Program. This is because CAFE is effectively a mandate on consumption, not production – measured by what consumers take out of the showroom rather than what automakers put into the showroom. Unfortunately, consumer adoption of alternative powertrain vehicles has simply not lived up to expectations despite a 174 percent increase in such models being available to consumers since 2010. This is likely to continue in a low gas price environment -- which the Energy Information Administration (EIA) projects.

In 2011, you may recall President Obama's goal to put one million electric vehicles (PHEVs or BEVs) on the road by 2015. Yet, automakers have only sold 448,837 of these vehicles since the President declared this goal in his 2011 State of the Union speech – approximately 0.17 percent of the 260 million-plus U.S. passenger vehicle fleet.¹⁰ Furthermore, despite seeing a record-breaking 17.5 million vehicles purchased in 2015, sales of HEVs, PHEVs and BEVs combined were only 492,683 (378,402 of which were HEVs), representing approximately 2.5 percent of total light-duty vehicle sales.¹¹ To put that in perspective, 2015 sales of a single popular pickup truck line more than doubled the entire universe of HEVs sold (780,000 units versus 378,402).

¹⁰ IHS Polk data

¹¹ 2015 Ward's Automotive

Beyond that, in its 2015 *Annual Energy Outlook*, the EIA only projects PHEVs and BEVs at about one percent each of new LDV sales in 2040.¹²

Consumer Acceptance in Question

This begs the question, why are the majority of consumers not adopting these advanced technology vehicles, even in a record-breaking sales environment? The primary driver is record-low gas prices. The assumptions about gas prices that the agencies relied upon in the 2012 rulemaking deserve examination. One National Program was launched with an expectation of structurally high gas prices but is unfolding in a period of sustained low gas prices, profoundly impacting consumer choice. In the agencies' original analysis of the 2017-2025 joint rule, they predicted gas prices would be \$3.87 in 2010 dollars by 2025, or about \$5 a gallon. This assumption was made when fuel prices were at their highest level in the past 40 years, exceeding those of the late 1970s and early 1980s.¹³

The fuel market has shifted quite dramatically since the original ONP rulemaking in 2012. Earlier this month, the AAA National Average was \$2.22 and in August, gas prices in 14 states were below \$2.00 per gallon.¹⁴ While various uncertainties have the potential to disrupt the world oil market, in its 2015 *Annual Energy Outlook*, the U.S. EIA projects gas

¹² U.S. Energy Information Administration Short-Term Energy Outlook, Page E-8, [http://www.eia.gov/forecasts/aeo/pdf/0383\(2015\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2015).pdf)

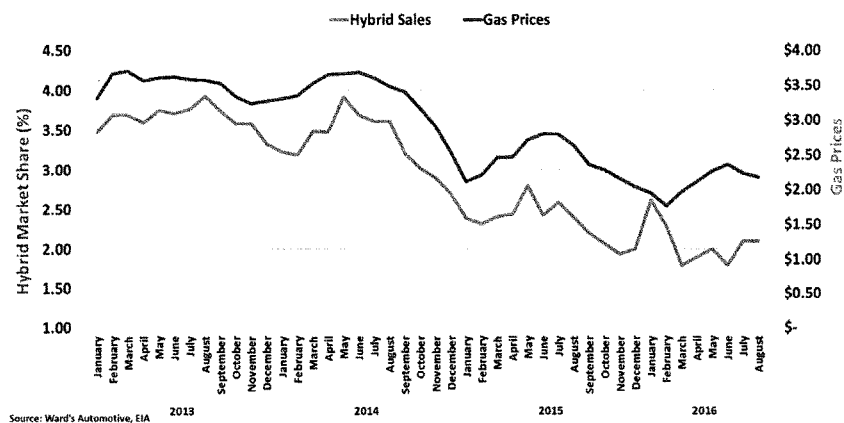
¹³ U.S. Energy Information Administration Short-Term Energy Outlook Real Prices Viewer, <http://www.eia.gov/forecasts/steo/realprices/>

¹⁴ <http://gasprices.aaa.com/>

prices to remain relatively low through 2030.¹⁵ Such low gas prices have resulted in a disconnect between consumer preferences and the CAFE/GHG emission standards. The original 2012 ONP rulemaking projected the 2025 vehicle fleet to be comprised of 67 percent passenger cars and 33 percent trucks. However, the agencies updated assessment in the Draft TAR now projects that the fleet mix in 2025 will likely be 52 percent cars and 48 percent trucks – acknowledging the direct impact low gas prices have on the vehicle fleet.

When gas prices fall, especially in the context of improving mileage across segments of the market, the desire to walk out of the showroom with a hybrid (or other alternative powertrain) diminishes (see Figure I).

Figure I: Retail Market Share of Hybrid and Gas Prices: 2013 – August, 2016



¹⁵ <https://www.eia.gov/forecasts/archive/aeo15/>

Some would point to the attribute-based CAFE requirements for cars and trucks as a complete solution to counteract any shifts in consumer choice due to low gas prices. Although attribute-based standards help ensure the entire fleet improves regardless of large shifts in demand, consumers still choose how much they are willing to spend on features other than fuel-efficiency improvements *within the same vehicle platform* (even within the same footprint and class). Often *within a model*, consumers demand options for different levels of performance and features that affect fuel economy and GHG emissions. **For example, consumers are overwhelmingly choosing to purchase a model with a conventional powertrain in lieu of that same, costlier model with a hybrid electric powertrain. As a result, achieving fuel economy targets even within a particular vehicle footprint/platform depends on consumers' willingness to pay for the greater fuel economy options within that platform, if at all available. We believe that the EPA and NHTSA incorrectly assume via the draft TAR that consumers will make such vehicle efficiency decisions irrespective of the costs involved.**

Even without the recent fall in gasoline prices, consumers show signs that their interest in buying models and options that provide the “super” fuel efficiency gains has diminished either because fuel economy is a less important factor or they are very pleased with the existing fuel economy gains or they can’t afford the costlier technology. In effect, some consumers seem to be saying “enough is enough – let’s bank these savings” – and allocate what they might have spent on larger fuel-savings alternatively on other safety, style and performance attributes – or other household priorities such as retirement savings or college tuition.

Strategic Vision conducts a comprehensive post-purchase survey of over 300,000 new car buyers each year, investigating the motivations driving consumer choices. The 2015 National Academy of Sciences (NAS) Report on fuel economy acknowledges that Strategic Vision provides “the most reliable information about consumer preferences.”¹⁶ **Although fuel economy matters to consumers, buyers have multiple priorities to balance when making a vehicle purchase. Strategic Vision’s polling showed that the decision on what vehicle and what options to buy is informed by many other factors, as well. Figure II indicates that fuel economy/mileage ranks 26th as a purchase rationale.**

Figure II: Vehicle Buyer Purchase Reasons

Rank	Purchase Reasons	Percent
1	Overall Safety of the Vehicle	64%
2	Overall Driving Performance	63%
3	Safety Features	62%
4	Front Visibility	60%
5	Braking	59%
6	Overall Value for the Money	58%
7	Price/Deal Offered	57%
8	Overall Impression of Durability/Reliability	56%
9	Riding Comfort	54%
10	Comfort of Front Seat	54%
11	Handling	53%
12	Rear Visibility	53%
13	Warranty Coverage	53%

¹⁶ 2015 NAS Report, p. 325.

14	Road Holding Ability	51%
15	Engine Performance	50%
16	Affordable to Buy	50%
17	Haul Cargo in Bed	50%
18	Fun To Drive	50%
19	Overall Seat Comfort	50%
20	Maneuverability	48%
21	Overall Thoughtful Engineering	48%
22	Past Experience With Brand	47%
23	Driver Seat Adjustability	47%
24	Overall Experience with Selling Dealership	47%
25	Front Seat Roominess	47%
26	Fuel Economy/Mileage	46%

Source: NVES 2016 Survey

In 2015, after reviewing the Strategic Vision survey results, the NAS panel concluded that, “...while consumers value fuel economy, they do so in the context of other attributes they also value... they look for the most fuel-efficient version of a vehicle they already want to purchase... Consumers are buying fuel efficient versions of vehicles that suit their wants and needs.”¹⁷

During the initial years of One National Program, automakers have generally been able to meet fuel economy targets by introducing available, affordable fuel-saving technologies to consumers. However, as previously discussed, the future CAFE targets will require newer,

¹⁷ 2015 NAS Report, p. 327.

costlier technologies and higher rates of electrification versus what NHTSA and EPA project in their updated Draft TAR modeling. Consumer acceptance entails more than their preferences or willingness to pay for efficiency – factors that are often influenced by fuel prices as previously discussed. It also entails their ability to actually pay for the increased costs associated with highly efficient technologies that will be needed to comply with future targets. This is a complex issue requiring analysis of new vehicle costs, household disposable income and the cost of capital among other factors.

Over the past 23 years, automakers have added new emission control and fuel-efficient technologies, safety features (electronic stability control, backup cameras, tire pressure monitors, automatic braking systems, etc.), connectivity and infotainment technologies, and other features that drivers increasingly demand. These new features, combined with the growing demand for SUVs and light trucks, caused average new car prices to increase by more than 60%. In December, 2015, Kelly Blue Book reported the estimated average transaction price for light vehicles in the United States had reached an all-time high of \$34,428.¹⁸

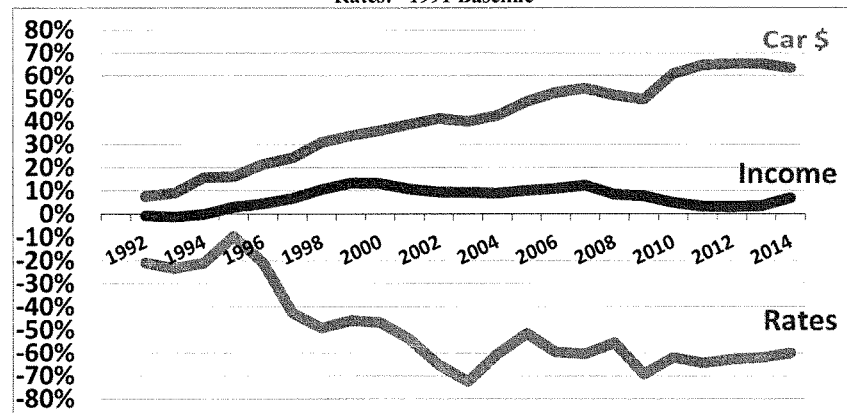
Affordability is Key

As noted in Figure III, over the past 15-20 years as new car prices increased, interest rates dropped dramatically and remained low, making it possible for consumers to continue buying new light-duty vehicles; in essence, the increased vehicle cost was offset by the low cost of capital. In addition, average loan terms have lengthened significantly, approaching seven-year

¹⁸ <http://mediaroom.kbb.com/record-new-car-transaction-prices-reported-december-2015>

terms and more consumers are leasing vehicles as well. While this has allowed consumers to keep their monthly payments affordable during a period of stagnant household income, the assumptions that EPA and NHTSA rely on in the Draft TAR for future compliance is based on overly optimistic modeling.

Figure III: Percent Change of Median Household Income, New Car Prices, And Interest Rates: 1991 Baseline



For the Midterm Evaluation, the agencies (as well as Congress, state officials, and the general public) must evaluate how the slowdown in growth of disposable personal income,¹⁹ combined with the Federal Reserve's recent decision to begin increasing interest rates (thereby increasing the cost of capital), will impact consumers' ability to afford the increasingly expensive technologies needed to meet the future CAFE and GHG standards. All this while keeping in mind that other regulations will simultaneously have an impact on vehicle production costs and

¹⁹ <http://www.tradingeconomics.com/united-states/disposable-personal-income>

achievable fuel economy. If consumers have difficulty affording the cost of new technologies required for compliance, they may decide to hold onto their current vehicles longer or purchase from the used vehicle market. In either case, the “virtuous cycle” of fleet turnover with safer and more fuel-efficient vehicles is stalled and the standards do not achieve their anticipated benefits.

“One National Program” has not Materialized: Better Harmonization Needed

As previously discussed, a key reason automakers supported the extension of One National Program to cover MY 2017-2025 was the inclusion of the Midterm Evaluation in the final rulemaking. Another expectation was that “One National Program” truly became One National Program for motor vehicle fuel economy standards – eliminating a piecemeal, fragmented automotive policy that is inefficient and costly to consumers. In fact, this principle was touted in the 2009 announcement of phase one of One National Program (covering MY 2012-2016) with then Assistant to the President for Energy and Climate, Carol Browner, stating: *“A clear and uniform national policy is not only good news for consumers who will save money at the pump, but this policy is also good news for the auto industry which will no longer be subject to a costly patchwork of differing rules and regulations.”* And again in the 2012 EPA Regulatory Announcement of the MY 2017-2025 Standards, by stating: *“Continuing the National Program ensures that auto manufacturers can build a single fleet of U.S. vehicles that satisfy the requirements of both federal programs as well as California’s program, thus helping to reduce costs and regulatory complexity while providing significant energy security and environmental benefits to the nation as a whole.”*

Unfortunately, the principle of One National Program is not materializing as significant harmonization gaps exist in the federal program. One National Program still amounts to three separate regulatory programs that are managed by three separate regulatory agencies.²⁰ As a result, the mechanics of the three programs and the flexibilities permitted in each are different. Compliance with one federal program does not guarantee compliance with all. These discrepancies are creating more immediate, near-term problems that must be addressed outside the Midterm Evaluation process.

The primary concern is the treatment of “credits” earned for exceeding the fleet requirements in a given model year. Under both the NHTSA and EPA programs, automakers can earn credits by producing cars and trucks that exceed the requirements in a given year -- and can then apply those credits to deficits that may occur in future years when the requirements are more stringent. As customer demands shift, or when the increasing stringency of the federal requirements exceed the automakers current fleet mix, credits are a key tool for a manufacturer to remain in compliance.

The credit program is a clear recognition that as the ONP requirements increase annually, the specific products that an automaker has in the market change over multiple years (typically every three to five years for cars and five to seven years for trucks). The goal for automakers is to have new products exceed the requirements in the early years (which generates credits) and apply

²⁰ The National Highway Traffic Safety Administration’s (NHTSA) Corporate Average Fuel Economy (CAFE) program; the Environmental Protection Agency’s (EPA) vehicle carbon dioxide/Greenhouse gas reduction program; and a similar greenhouse gas reduction program overseen by the California Air Resources Board (CARB)

those credits in the later years of that “product cycle.” As such, the intent of the credit program was to give automakers an opportunity to manage fleet compliance over time, rather than year by year. However, the CAFE and EPA credits programs are not the same and as automakers assess where they are currently and forecast future product development and customer demands, many are anticipating problems in managing compliance with the two different programs. In some cases, the inconsistencies between the EPA and NHTSA will likely create a situation where an automaker may be in compliance with the more stringent federal program (EPA) yet subject to fines in the other program (NHTSA).

Again, this is inconsistent with the Administration’s stated objective under One National Program which hasn’t materialized for automakers. As the stringency of the ONP requirements escalate in the coming years, automakers will need all of the tools possible to manage compliance. Instances where the existing regulatory programs are not harmonized hurt the integrity of the overall fuel economy program. It is important to note that addressing these harmonization gaps will not alter the stringency of One National Program as they do not require changes to the more stringent EPA GHG program. The Alliance, along with the Global Automakers, recently petitioned NHTSA and EPA to address these harmonization gaps; however, some cannot be addressed administratively and will require Congressional action. As previously mentioned, this is a more immediate problem that must be addressed outside of the scope of the Midterm and we look forward to working with the Administration and Congress to ensure the principle of One National Program is truly realized.

CARB not Fully Aligned with Federal Agencies

Also creating direct conflict with One National Program are the actions of the California Air Resources Board, who is once again driving the regulatory policy agenda by moving forward with a different schedule on the Midterm Evaluation process and proceeding with their costly Zero Emissions Vehicle (ZEV) mandate, a program adopted by California and nine other states that, collectively represent 30 percent of new vehicle sales.²¹

By the end of 2016 -- a full 16 months before the Federal government might issue a final decision on its Midterm Evaluation and roughly two years before NHTSA is required to promulgated a CAFE rulemaking -- CARB is expected to determine its Midterm Evaluation results.²² This early determination could threaten the ONP, unless the Federal agencies later reach the same conclusion as CARB. To date, CARB has not provided any rationale for reaching conclusions earlier than the Federal agencies.

While the CAFE/GHG programs both are effectively technology-neutral consumption mandates, the ZEV program is a consumption mandate that is not technology-neutral. It requires automakers to sell an increasing percentage of ZEVs such as fully electric vehicles, plug-in electric vehicles or hydrogen fuel-cell vehicles. By 2025, automakers will be compelled to sell enough ZEVs to reach at least a projected 15.4 percent of total new vehicles sales in each ZEV state. Despite various state sales incentives, there are concerns that the future ZEV sales

²¹ Section 177 of the Clean Air Act allows states to either follow the federal requirements or adopt California's vehicle emission regulations. Nine other states adopted the California ZEV regulation: Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont.

²² Mobile Source Strategy, California Air Resources Board, <http://www.arb.ca.gov/planning/sip/sip.htm>

requirements cannot be met in the time required, particularly in the cooler, less-populous Northeast states that have adopted the ZEV requirement. The ZEV mandate provides no net GHG benefit but adds significant compliance costs for consumers nationally. In fact, using data provided in the Draft TAR, the Alliance estimates that the ZEV mandate results in an average vehicle cost increase of \$356 – even for consumers who don’t purchase a new vehicle in a ZEV state. Unfortunately, the Draft TAR doesn’t factor in the cost of complying with the aggressive ZEV program. The ZEV and CAFE and GHG regulatory obligations cannot be isolated from one another. Both require compliance; they are not necessarily complementary and industry has a limited capacity to nudge buyers to purchase vehicles they either don’t want or are not willing to pay the actual cost for.

Conclusion

The Federal government estimates the total cost of the current ONP to be about *\$200 billion* from 2012-2025.²³ This is a significant regulatory burden on the auto industry and an accurate and thorough evaluation of potential employment impacts is critical for both the success of One National Program and the continued health of the manufacturing sector and the overall U.S. economy. It is imperative that we utilize this Midterm process to ensure we are on the right track. Also critical to success is ensuring that the principle of “One National Program” is finally realized and automakers can truly build a single fleet of vehicles to comply with the various programs. Automakers remain committed to achieving our environmental goals and are

²³ See <http://www.epa.gov/otaq/climate/regulations/420r10009.pdf> (EPA RIA for 2012-16 rule) and <http://www.epa.gov/otaq/climate/documents/420r12016.pdf> (EPA RIA for 2017-25 rule).

producing more fuel-efficient vehicles than ever. If One National Program was based solely on ensuring that fuel-efficient vehicle choices are offered, the industry would be well-positioned to meet the aggressive future standards. But consumers are in the driver's seat when it comes to raising the fuel economy of our nation's vehicle fleet. Developing new technologies and building safe, reliable, efficient vehicles is not the end of the challenge.

Thank you again for the opportunity to offer our views on One National Program. The Alliance stands ready to work with this Committee, Congress and the Administration during this critical Midterm Evaluation process.

Mr. BURGESS. The Chair thanks the gentleman. Mr. Peter Welch, you are recognized for 5 minutes for an opening statement, please.

STATEMENT OF PETER K. WELCH

Mr. WELCH. Chairman Burgess, Ranking Member Schakowsky, thanks for inviting me. I am Peter Welch—I am the other Peter Welch—the President of the National Auto Dealers Association. NADA represents more than 16,500 franchised new car and truck dealer members who sell new and used cars and trucks, arrange auto financing, perform routine repairs, warranty and recall work on millions of vehicles annually. Local dealerships collectively employ over 1.1 million Americans in good paying jobs and are located in every congressional district.

In America motor vehicles are not luxury goods. Affordable transportation is critical to personal mobility and freedom, essential to economic empowerment and a key driver of national productivity. Cars and trucks open up employment and housing opportunities that many Americans would not otherwise enjoy.

When it comes to decisions that affect the environment, local dealerships are providing their customers with unparalleled choices. In addition to incredibly efficient internal combustion engines, franchise dealers currently have on their lots over 75 different models of hybrid, plug-in electric and battery electric vehicles. Toyota dealers are even now selling fuel cell cars.

Local dealerships consistently educate buyers on the value of these technologies and how to use these vehicles and how they can fit into their lifestyles. The number one priority at every new car dealership is to serve its customers by providing them with the choices they want and at prices they can afford. Every one of our customers deserves to be able to purchase a vehicle that is right for them.

This means that during the midterm review careful thought needs to be given to keeping the cost of vehicles reasonable and to ensuring that people can still afford to buy a cleaner, greener, safer car or truck they really need or want. Washington should not make personal mobility so expensive that it is no longer available to the average American.

Consumers finance more than 90 percent of all new vehicle purchases. When regulations drive up the price of vehicles, fewer of our customers will be able to qualify for a car loan. The average price of a new car is at an all-time high, \$34,250, with an average monthly payment of \$510. This is with historically low interest rates. Right now they are at like average 4.2 percent, but the terms keep getting longer and longer. They are stretched out to 68 months now, on average.

Since 2005, the percentage of personal income necessary to purchase a new vehicle has risen from 9.5 percent to 12.4 percent today. It is taking a bigger chunk out of the wallet. This already puts new vehicle purchases beyond the reach of millions of Americans. That is why affordability is everything. We need to ensure that people can buy the cars they want or need, and make it possible for average Americans to afford cleaner new cars and trucks.

If moves here in Washington force our customers out of new cars because the technology needed to attain the 2022 to 2025 regu-

latory targets raise loan payments by \$50 or \$60 a month, many of our customers will be forced to drive less safe, less efficient, dirtier used cars, and the CAFE greenhouse gas regulations will become counterproductive.

Let me be clear about one thing. America's new car dealers are not on opposite sides of this debate. Dealers are in favor of national policies to reduce greenhouse gas emissions, increase fuel efficiency, and promote energy independence. What we are standing for is affordability and to make sure our customers, your constituents, are put first.

An approach that enables more customers to purchase affordable new cars and trucks will produce a winning scenario for everyone—dealers, manufacturers and the driving public. If we work together we have a perfect opportunity in the midterm assessment to ensure that our customers have access to clean, efficient new vehicles at affordable prices. Thank you.

[The prepared statement of Mr. Welch follows:]



WRITTEN STATEMENT OF
PETER K. WELCH, PRESIDENT
NATIONAL AUTOMOBILE DEALERS ASSOCIATION

before the

Subcommittee on Commerce, Manufacturing and Trade

Subcommittee on Energy and Power

Energy and Commerce Committee

U.S. House of Representatives

hearing entitled

**“Midterm Review and an Update on the Corporate Average Fuel Economy Program and
Greenhouse Gas Emissions Standards for Motor Vehicles”**

September 22, 2016

Chairman Burgess and Vice-Chairman Olson, Ranking Members Schakowsky and Rush, and members of the Subcommittees, thank you for inviting me to testify. My name is Peter K. Welch, and I am President of the National Automobile Dealers Association (NADA). NADA is a national trade association that represents over 16,500 franchised new car and truck dealer members. NADA members are primarily engaged in the retail sale and lease of new and used motor vehicles, but also engage in automotive service, repairs and parts sales. Last year America’s franchised dealers collectively employed over 1.1 million individuals, and sold or leased over 17.84 million new passenger, light duty and heavy duty vehicles and 14.65 used vehicles (32.49 million vehicles in total). NADA members operate in every congressional district in the country, and 40 percent of our members sell fewer than 300 new vehicles per year.

We welcome the opportunity to comment on EPA’s recently released Technical Assessment Report (TAR) through the lens of the customer. The success or failure of any new fuel economy regulation ultimately will be determined not by regulators, but by individual customers, who will “vote” with their checkbooks by purchasing vehicles that best meet their needs and budgets. There is only one infallible metric for measuring customer choices for motor vehicles – which vehicles are registered for use each year in the United States.

Through the franchise system, the nation’s automobile manufacturers rely upon the nation’s franchised dealers to sell vehicles to individual customers. The auto manufacturers

design and manufacture cars and trucks, but the nation's dealers sell them to customers. Automakers engage in significant marketing campaigns to create brand awareness and stimulate customer demand for vehicles; however, the dealers assume the economic burden for stale inventory. The risk of loss for new vehicle inventory passes from the manufacturer to the dealer at the factory gate. The manufacturer books a sale once a vehicle rolls off the assembly line and is shipped to a dealership, but the dealer only books a sale when a customer actually buys the vehicle. Because the nation's franchised auto dealers are willing to invest their own private capital in a national sales and distribution network, customers enjoy an extraordinary array of competitive choices both within brands and across brands and for new and used vehicles. This franchised dealer network is good for customer choice and convenience, good for manufacturers and their shareholders, and good for local, state and national economies.

In America, the motor vehicle is not a luxury good; affordable transportation is a core component of personal mobility and freedom, an essential building block to individual economic empowerment, and a key driver of national productivity. Henry Ford's vision of a more efficient manufacturing process was premised on dramatically expanding the number of people who would be able to buy cars. For example, he wanted to produce a vehicle that Ford factory workers could afford. In a similar vein, NADA was founded nearly 100 years ago because some in Congress wrongly viewed automobiles as luxury goods and wanted to tax them as such. The imposition of regulatory-driven costs could have exactly the same adverse impact on customers as a luxury tax.

We have a constitutional right to travel freely within our country, but that right is nearly meaningless without affordable mobility. Just as important, when viewed through the lens of an individual, vehicle ownership dramatically increases personal economic opportunity. Car owners have a better chance of finding affordable housing, and they have a better chance of finding a job or keeping a job. They can relocate more easily if the job opportunities decline in one area and increase in another. Often access to an affordable vehicle creates the opportunity to become an entrepreneur. In sum, an affordable, reliable car is an essential part of the economic fabric for families all across America. That is why NADA continues to focus on how future regulatory changes will affect the costs of new and used vehicles. Policy makers should do all that they can to avoid the negative consequences of driving up vehicle costs beyond the financial reach of working men and women.

If the fuel economy policies force auto manufacturers to produce vehicles that customers do not want or cannot afford to buy, no one wins. In sharp contrast, a flexible, fact-based policy that reinforces customer preferences for newer vehicles will accelerate fleet turnover, thereby simultaneously providing numerous environmental, safety, economic, and national security benefits. Typically, an individual choosing a newer vehicle will be acquiring a safer, more fuel efficient vehicle. The societal benefits are even broader, including the national security benefits associated with increases in fuel efficiency, increased air quality gains, and the economic benefits directly attributed to motor vehicle commerce in America. America's auto dealers support continuous improvement in the fuel economy of the fleet of vehicles that customers drive on the nation's roads. The key is to design policies that leverage, rather than frustrate, customer choices in the market so that we accelerate the replacement of the older cars that are less safe and less fuel efficient.

The effectiveness of our national fuel economy policies depends not only upon the efficiency of the new vehicles coming off the assembly line, but also on the efficiency of the entire national fleet in operation in the United States. Today, a total of approximately 262 million cars and trucks are registered for use on America's public roads. During the past two decades, motor vehicle manufacturers have made dramatic improvements in the quality of their respective vehicles. As the manufacturers have increased the reliability and durability of their products, customers have held onto their vehicles longer. The average age of the light-duty vehicles on the road in 2015 was 11.5 years. As a result, one of the key elements of a truly effective fuel economy policy – accelerating overall fleet turnover – has become more challenging.

America's franchised dealers meet customer demand by making one sale at a time. There is not one monolithic market for new cars in America; to the contrary, there literally are hundreds of different markets. Throughout the country franchise dealers do what they have done for more than 100 years – they match supply and demand in their respective markets. And how do they accomplish that? By meeting the unique transportation needs of their respective customers. Each customer has different transportation needs, different budget constraints, different credit concerns, different trade in allowances, and different tolerances for new technology. No two customers are exactly alike, so no two purchases are exactly alike. While two customers may buy the same trim package on the same new car, the customers are likely to have different credit profiles, use different lenders, have different trade in values or no trade in at all, one may customer may buy and one may lease, one may buy when gasoline costs \$4.00 a gallon and one may buy when gas costs \$3.00 a gallon, and one may have a 60 mile commute and one may not have a commute at all. As a result, attempts by government to control the precise product mix and market outcomes will be doomed from the start.

Vehicle cost is a key driver in the vast majority of vehicle purchases, affecting both the ability and the willingness of customers to make a purchase. Customers finance or lease more than 90 percent of all new-vehicle acquisitions. Each time regulatory costs drive up the price of vehicles coming from the factory, fewer customers will be able to qualify for the loan amounts necessary to buy a new car. For example, the average price of a new car today is approximately \$34,250, which is beyond the reach of millions of Americans. To put that in perspective, the average monthly payment for such a vehicle, even with today's low interest rates, is \$510 per month to buy and \$406 to lease. These numbers presume a 10 percent down payment, exclude taxes, title and registration fees and are calculated using current historically lower finance rates of 4.19 percent. Proponents of higher fuel economy standards readily admit that vehicle costs will increase, but they assert that customers will be able to use the savings from lower fuel costs to cash flow the higher monthly payments. Unfortunately, the market does not work that way. Auto lenders do not extend credit based on future savings – they extend credit based on the purchase price of the car, the amount financed, and the buyer's debt to income ratio. Lenders require a borrower to qualify for a loan amount equal to the "up-front" costs of the car, regardless of the prevailing price of the fuel. The lenders do not (and will not) assume the risk of fluctuating energy prices when underwriting an auto loan. These upcoming fuel economy rules will price millions of potential buyers out of the market, simply because auto lenders will not finance a new fuel efficient vehicle based on its future fuel savings.

For individual customers, in addition to the threshold question of what will the bank finance, the more important assessment is what the customer is willing to pay. How does a vehicle purchase fit within a customer's family budget? The answer to that question drives individual decisions in dealer showrooms thousands of times each day, and long before customers ever drive onto a dealer's lot. Should I buy a new car or a newer used car? Should I repair my existing car? Should I defer a car purchase because of an uncertain economy? After all, I still have to pay for my son's braces, my daughter's college tuition, or other important family expenses. Dealers meeting the needs of their customers in the market today will tell you that a difference of less than \$20 or \$30 dollars per month will have a material difference in an individual's choice of vehicle. These are the real choices that confront customers every day, and the answers to those questions will be affected directly by regulatory-driven price increases. And the impact is not just on new vehicles. Each time the manufacturer increases the price of a new car or truck, the price of recent used cars or trucks of the same make and model will increase as well. These real world, market-driven pricing realities reduce the pool of people able to purchase new and used vehicles and the pool of those willing to purchase new and used vehicles.

The prevailing price of gasoline is also a key cost variable that affects customer preferences. The number of fuel efficient vehicles on dealer lots today, whether conventionally fueled or powered by new technology, is unprecedented. Almost 500 vehicle models in dealer showrooms have ratings in excess of 30 mpg. Similarly, customers can find over 75 models of hybrids, plug-in electric and battery electric vehicles on lots if they wish to drive one home tonight. And, NADA assisted them by producing and distributing a best practices guide specifically focused on providing practical tips to meet the growing customer demand for electric vehicles.¹ However, the fleet mix of traditionally-fueled vehicles and the market penetration of electric vehicles is directly affected by the prevailing price of gasoline. The ratio of passenger cars to light trucks and SUVs tracks the price of fuel, and that relationship again has been reflected in the purchasing mix since the price of oil has dropped precipitously. Americans are buying more light trucks and SUVs than passenger vehicles. Similarly, the sale of EVs did not reach the President's goal of 1 million vehicles by 2015 (despite substantial federal and state tax credits and other inducements) because EV sales are directly influenced by fuel price fluctuations.² Simply put, customers can do the math. They understand that lower fuel costs extend the payback of the additional upfront costs of a hybrid or an EV.

Despite the administration's attempt to create "one national program" for fuel economy, three counter-productive and duplicative standard-setting mechanisms persist, creating excessive costs and threatening vehicle affordability. As part of the Energy Policy and Conservation Act of 1975, Congress created the Corporate Average Fuel Economy (CAFE) Program under the authority of the National Highway Safety Administration (NHTSA), which was for over three decades the only fuel economy program. As recently as 2007, Congress directed NHTSA alone to increase fuel economy by 40 percent under CAFE.

However, a single regulator no longer exists. The combination of California's effort to increase fuel economy by mandating the reduction of greenhouse gases and the Obama Administration's initiative to regulate greenhouse gases under *Massachusetts vs. EPA* has created a far more complicated structure for regulating fuel economy. Currently three regulators

¹ *A Dealer Guide to Marketing Electric Vehicles.*

² Brad Tuttle, "So About That Goal of 1 Million Electric Cars by 2015..." Money, Jan. 22, 2015.

write three different fuel economy rules pursuant to three different laws. In 2010, the Administration set a 35.5 mpg standard by model year (MY) 2016. EPA regulators again bypassed Congress by announcing a new 54.5 mpg fuel economy target for MY 2025 vehicles on August 28, 2012, which included a mid-term review. This approach of setting CAFE standards enhances the likelihood of unintended consequences, because under the Clean Air Act, a law which was not designed to regulate fuel economy, EPA and California do not account for national job loss, customer choice, and vehicle affordability during the standard setting process.

In issuing the TAR, the administration is setting the stage for another counter-productive regulatory action next year to implement the mid-term review. Despite the complexity of the 1,200 page document and the abbreviated public comment period, one thing is abundantly clear from our preliminary analysis – our customers will have to pay more to meet their transportation needs as a direct result of assumptions in the TAR. We believe that the TAR grossly underestimates the economic impact our customers will face unless the regulations are improved. Based on the types of available technology that will be needed to meet the 2025 CAFE/GHG targets (multi-speed transmissions, turbo-charging, mass hybridization, electrification, etc.), we project that the average price of a new vehicle would increase significantly. As a result, more people will be priced completely out of the new car market or face fewer economic choices for new vehicles. The same will be true in the used vehicle market, because the pricing trends in the used vehicle market reflect the new vehicle trends. Given the potential magnitude of these cost increases, in addition to other environmental and technology-driven cost increases in recent years, the American consumer cannot afford a rush to judgment. The TAR and the mid-term review must be done with full transparency and rigorous, public analysis.

In conclusion, while government regulations can force manufacturers to make certain types of vehicles and deliver them to dealers, if customers are not willing or able to buy the vehicles, the policy objectives will fail. Our members' primary concern is for their customers because of the prices increases that are inevitable. But as a practical matter, the additional reality is that any mandate that forces the production of vehicles that customers do not want or cannot afford will only serve to slow down, rather than accelerate, the already dramatic fuel economy improvements that the industry has made to date.

Customers will render the final verdict on the success or failure of the EPA/NHTSA/California fuel economy programs. Customers will vote with their pocket books, and the results will be reflected in the number and the mix of new vehicles registered for use each year in the United States. The faster we turn over the existing fleet of 262 million cars, the sooner we will achieve our safety and environmental goals, strengthen our national security and enhance our economy.

Mr. BURGESS. The Chair thanks the gentleman. The Chair recognizes Dr. Graham, 5 minutes to summarize your opening statement, please.

STATEMENT OF JOHN D. GRAHAM

Dr. GRAHAM. Thank you, Mr. Chairman. The theme of my testimony is that a new issue should be added to the midterm review, the need to coordinate the California Zero Emission Vehicle program with the Federal regulations. Specifically, I recommend that the Congress commission an independent, cost-benefit study of the California regulation and compare it to the Federal regulations and look for harmonization options.

My recommendation is based on three concerns. One, from a technology perspective, regulators in Washington, DC, and in Sacramento, California, are pushing the automakers in conflicting directions. The Federal regulators expect automakers to accelerate their investments in greener versions of the gasoline internal combustion engine.

The regulators in California expect automakers in the same time frame to replace the gasoline engine with plug-in electric vehicles or fuel cell vehicles. Please note that when I refer to California, I include the nine other States mostly in the Northeast that have joined the California Zero Emission Program. In total, these 10 States account for about 30 percent of all new vehicle sales in the country.

My second concern is that it has proven much more difficult to sell plug-in electric vehicles than many of us thought in 2002 when this regulation was developed. California expects automakers to achieve an 18 percent penetration rate of plug-in electric vehicles by 2025, updated from a previous estimate of 15 percent. But the sales of such vehicles actually declined in 2015 compared to 2014. The sales raise now about 3 percent in California, and less than one percent in much of the country.

In an excellent 2015 report, the National Research Council documented the numerous barriers to commercialization of plug-in electric vehicles, but I would like to highlight three of them that are new today compared to when California adopted the regulation in 2012. First, gas prices as everybody has noted are much lower. Instead of \$4 per gallon and going higher, they are projected to be under \$3 a gallon all the way through 2025.

Second of all, the Federal regulations are discouraging a consumer from purchasing a plug-in electric vehicle and that is because if there are plenty of gasoline vehicles on the market getting 40 to 60 miles per gallon, how can a dealer persuade a consumer to pay extra for a plug-in electric vehicle? So the Federal regulations are actually undercutting the California program.

Third, the incentives offered by the Government are inadequate to spur commercialization of plug-in electric vehicles. The generous \$7,500 Federal income tax credit is forecasted to expire before 2025 at least for several manufacturers. Some States such as Colorado and Connecticut have recently added incentives to purchase plug-in electric vehicles, but other States—Georgia, Illinois, and California—have scaled back or eliminated entirely their cash incentives for electric vehicles.

In fact, some States have added new taxes on electric vehicles because owners do not pay any gasoline tax to fund road repairs. Why should a consumer pay extra for an electric vehicle if the Government is going to turn around and add an extra tax on electric vehicles? This is not a single national program that is well coordinated, let me assure you of that.

My faculty colleagues at Indiana University have recently issued a report on the many constructive policies that can be enacted to spur commercialization of plug-in electric vehicles, but if governments do not get serious about helping dealers sell electric vehicles, the California regulation which covers almost a third of the country is going to prove to be a very onerous regulation.

I conclude with two questions that I pose to my students when we discuss this issue in class. One, if California regulators are right, why not eliminate the Federal regulations and convert the California Zero Emission Vehicle program into a national regulation; or two, if the Federal regulators are right, why not preempt the California regulations and let the marketplace determine what the most cost effective technologies are to comply with the regulation?

In conclusion, I recommend during the midterm review that Congress commission an independent, cost-benefit study of the California regulations compared to the Federal regulations, and address this as soon as possible. Thank you very much for your time.

[The prepared statement of Dr. Graham follows:]

Testimony of John D. Graham, Ph.D., Dean, School of Public and Environmental Affairs,
Indiana University, [REDACTED]

Hearing Title: Midterm Review and an Update on the Corporate Average Fuel Economy
Program and Greenhouse Gas Emissions Standards for Motor Vehicles

Joint Hearing of Subcommittee on Commerce, Manufacturing, and Trade and the Subcommittee
on Energy and Power, U.S. House of Representatives

Date: Thursday, September 22, 2016

My name is John D. Graham. I am Dean of the School of Public and Environmental Affairs (SPEA) at Indiana University (IU) where I also teach public policy analysis and conduct research on regulatory reform issues. From 2001 to 2006, I served as Administrator of the Office of Information and Regulatory Affairs (OIRA) at the White House Office of Management and Budget (OMB). In that capacity, I chaired the federal interagency task force that rejuvenated the Corporate Average Fuel Economy (CAFE) Program. CAFE regulations of the auto sector had been subject to a congressional freeze for almost a decade, starting in 1996.

At the direction of President George W. Bush, I helped develop a plan that raised the light truck CAFE standards for model years 2005-2011 and reformed the program to set standards based on vehicle size (measured as vehicle footprint). The "footprint" reform was designed primarily to minimize any potential adverse safety effects of CAFE (Graham, 2008), but that same reform seems to have built stronger industry acceptance of the program, possibly by spreading the compliance costs of the program more evenly across vehicle manufacturers. After I left the White House in 2006, President Bush worked with the Congress to develop a more comprehensive legislative reform of the CAFE program (Graham, 2010, 176-179), and that law is now being implemented by President Obama and his team at the Environmental Protection Agency (EPA) and the National Highway Traffic Safety Administration (NHTSA). President Bush's unexpected role as champion of CAFE is explored in my 2010 book (Graham, 2010, Chapter 6, 163-193), *Bush on the Home Front: Domestic Policy Triumphs and Setbacks* (Indiana University Press, 2010).

If Congress were to enact an economy-wide fee on greenhouse gas emissions, the EPA, NHTSA,

and California regulations we are discussing today might not be necessary. But, in the absence of an appropriate greenhouse gas fee or an equivalent rise in the federal gasoline tax, I support the retention and refinement of federal performance standards for fuel economy and/or greenhouse gases. I am also pleased that the Obama administration is devoting substantial resources to the "midterm review" of the model year 2022-2025 federal standards. In my new book (Graham, 2016) on President Obama's domestic policies, *Obama on the Home Front: Domestic Policy Triumphs and Setbacks* (Indiana University Press, 2016), I argue that President Obama's automotive policies -- though less publicized than the Affordable Care Act -- are among his most significant achievements.

The draft Technical Assessment Report (TAR) (EPA/DOT/CARB, 2016), which is one of the most complex and detailed regulatory documents I have ever read, is now available for public comment and will inform U.S. and California regulators during the next presidential administration. I would like to praise the efforts of the career civil servants and contractors who participated in the production of the draft TAR. It is far from a perfect document but it contains a massive amount of detailed engineering and economic information, and merits careful consideration by stakeholders, regulators, and legislators. Frankly, I wish the federal government would reconsider their recent decision against an extended period of public comment on this crucial document. Given the immense complexity of the draft TAR and the near-term demands on my time, I will not be able to comment on it.

With financial support from the Alliance of Automobile Manufacturers, a team of us at IU-SPEA are now exploring the cumulative macroeconomic effects of several regulatory programs:

NHTSA's Corporate Average Fuel Economy standards, EPA's greenhouse gas standards, California's greenhouse gas standards, and California's Zero-Emission Vehicle (ZEV) requirements. All of these programs impact the automotive industry, from vehicle manufacturers and their suppliers to car dealers and consumers. We issued a preliminary report earlier this year (Carley et al, 2016), which is now publicly available for comment, and we intend to issue our final report early next year. The testimony I shall offer today, while it draws insights from our preliminary report, represents my views alone. The opinions I express should not be attributed to the Alliance, SPEA, IU or my co-authors.

In my testimony today, I would like to focus on a crucial issue that has not yet received adequate attention in the mid-term review: the unexplored interaction of the California ZEV program with the EPA and NHTSA programs. Let me emphasize that I am not referring to the California GHG standards, which the Obama administration and California have artfully subsumed within the EPA and NHTSA programs -- at least temporarily. I am referring to the California ZEV requirements for model years 2018-2025, requirements that were established in early 2012 and are now under a separate review at the California Air Resources Board (CARB) (CARB, 2016). CARB has a strong track record in technology-forcing regulation, and historically has rivaled EPA as a producer of effective emissions-control regulations (Carley et al, 2011).

1. What Is the California ZEV Program?

Under California law, a ZEV has zero emissions of pollutants from the tailpipe during motor vehicle operation. Plug-in electric vehicles such as the Nissan Leaf and the Tesla Model S are

ZEVs. A plug-in hybrid electric vehicle (PHEV), such as the Chevrolet Volt, is considered a "transitional" ZEV (TZEV) under California law: it is powered by the combination of gasoline and electricity and therefore has some residual tailpipe emissions. The implication of the word "transitional" is that CARB is allowing PHEVs only for a limited period of time, which signals to automakers the need to invest resources in BEVs and/or FCVs, or what CARB calls "pure ZEVs" (CARB, 2016). A key question for CARB is how PHEVs should be handled in future compliance credit formulas, since some studies suggest PHEVs are actually more cost-effective investments for society than BEVs (Michalek et al, 2011).

The ZEV program was authorized in the 1990 Clean Air Act Amendments as a tool to help California achieve compliance with EPA's health-based standards for ozone, particulate matter, and other local air pollutants. Replacing gasoline vehicles with ZEVs was seen as a tool to help southern California and other smog-ridden cities accelerate their progress toward clean-air attainment. The 2023 and 2032 EPA compliance deadlines for ozone nonattainment in the South Coast and San Joaquin regions of California may require significant use of PEVs by motorists (EEE Inc., 2014, 27). Thus, the ZEV program was not originally seen as a greenhouse gas (GHG) program to address global climate change.

Following a 2008 public hearing where the climate rationale for ZEV was first advanced, CARB reengineered the ZEV program as part of California's ambitious efforts to slash GHG emissions from the state's economy (CARB, 2012). In 2012 CARB set a goal of 100% ZEV sales in the State by 2040-2050 to help combat global climate change (CARB, 2012). In 2016 CARB refined those goals with a target of 40% ZEV penetration by 2030 and 100% by 2050 (CARB,

2016).

Basically, the ZEV program requires that any vehicle manufacturer doing significant business in California must distribute for sale a certain number of ZEVs that corresponds to a specified number of ZEV credits. CARB has published a schedule of how many ZEV credits are earned by vehicles of different design. If a manufacturer does not earn those credits, they must purchase them from another manufacturer, pay fines, and/or an enforcement action can be taken against the company (which could mean that the company's ability to sell vehicles in California may be jeopardized).

As a practical matter, CARB believes that vehicle manufacturers will comply with the ZEV requirements primarily by offering a mix of plug-in battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (CARB, 2011). BEVs and PHEVs, together, are generally referred to as plug-in electric vehicles (PEVs). Some manufacturers, such as Toyota, may instead offer hydrogen fuel-cell vehicles (FCVs), and the State of California is taking steps to create a limited hydrogen refueling infrastructure. Conventional hybrid-electric vehicles (without a plug-in feature), such as the Toyota Prius, are no longer eligible for compliance credits under the ZEV program.

In 2012 EPA awarded CARB the necessary waiver under the Clean Air Act to implement the ZEV program (EPA, 2012). However, EPA did not support its waiver decision with any cost-benefit analysis, perhaps in part because Congress in 1990 did not compel such an analysis for waiver decisions. In 2011 CARB released a cost-benefit analysis to support the ZEV

requirements (CARB, 2011) but that analysis was prepared from California's perspective (i.e., it did not address benefits and costs in other states or other regions of the country), and the CARB analysis would not likely have passed muster had it been reviewed by OMB analysts under OMB Circular A-4. For a more detailed critique of CARB's cost-benefit analysis of the ZEV program, see my 2012 House testimony prepared for the Judiciary Committee's Subcommittee on Courts, Commercial and Administrative Law (Graham, 2012).

For the automotive industry, the California ZEV program may become a much larger regulatory challenge than the NHTSA and EPA requirements for fuel economy and greenhouse gas control. Although the estimated costs of producing a ZEV appear to be declining rapidly due to advances in technology and production processes (Carley et al, 2016), a ZEV remains quite expensive to produce (i.e., the cost premium can be more than \$10,000 per vehicle) compared to a gasoline-powered vehicle (National Research Council, 2015a). ZEVs also require construction of new infrastructure for motorists to recharge the batteries or refuel their hydrogen tank. Despite these challenges, CARB projected in 2012 that the ZEV regulation would result in about 15.4% of new vehicles sold in California in 2025 being BEVs, PHEVs or FCVs (CARB, 2012). More recently, CARB updated the 2025 penetration rate to 18% (CARB, 2016, Table 15, 166).

Some automakers have amassed a large supply of unused ZEV credits from earlier years when CARB awarded credits for conventional hybrids such as the Toyota Prius. Other automakers have relatively few unused credits and face challenging near-term compliance obligations in California. The ZEV program is structured so that start-up makers of PEVs (e.g., Tesla and other PEV start-up companies) can earn ZEV credits and sell them to other automakers who need them. The selling of ZEV credits appears to be a significant feature of Tesla's business model,

and Tesla executives have publicly advocated that CARB should enact even more stringent ZEV requirements in the near future (Edelstein, 2015; Knittel, 2014). A recent study commissioned by the Natural Resources Defense Council is also recommending that the ZEV program be made more stringent than it is today, in part because Tesla's potential commercial success could take other automakers off the hook to produce PEVs (Shulock, 2016).

2. How Have Nine Other States Joined the California ZEV Program?

The Clean Air Act amendments of 1990 do not allow each of the 50 states to enact their own vehicle emission standards. However, individual states are allowed to copy California standards if they prefer them to EPA standards. Opt-in states -- sometimes called "ZEV states" or "Section 177 states" -- are not required to prepare a cost-benefit analysis to support their decision to join the ZEV program; nor are they required to invest in the infrastructure -- or enact other complementary policies (e.g., state consumer tax credits or HOV lane access for ZEVs) -- that would help dealers sell ZEVs to consumers in large quantities. Some states are doing a much better job than others in helping automakers and dealers prepare for the ZEV requirements (Lutsey et al, 2015; Clark-Sutton et al., 2016) and a recent report from the National Research Council (2015a) advances a variety of solutions to overcome the many barriers to commercialization of PEVs.

Nine states (Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont) have opted into the ZEV program. California and those nine states account for about 28% of new vehicle sales in the United States (2015). Some automakers,

because of their product mix, sell roughly 50% of their vehicles in these ten states. Thus, the ZEV regulation is effectively a national regulatory program even though it has never been subjected to a national cost-benefit analysis.

CARB lessened the compliance burden of the ZEV program with a "travel provision" that allows ZEVs produced in one state to count toward compliance obligations in other ZEV states. The travel provision is scheduled to expire next year (2017), and will be replaced temporarily by complex eastern and western compliance pools from 2018 to 2021. However, PEV sales in California will no longer be able "travel" to other areas for compliance purposes. Thus, the ZEV requirements will soon become a significant challenge for the nation's automakers and dealers, and will have national economic ramifications.

3. What are the barriers to widespread commercialization of PEVs?

The number of PEVs sold in the United States from 2010 to 2015 has grown at a lesser rate than expected by both the federal government and PEV producers, and, in fact, the national rate of PEV sales declined in 2015 compared to 2014 (Carley et al, 2016). Early indications are that the national volume of PEV sales in 2016 will increase modestly. In total, approximately 114,000 PEVs were sold in 2015, which is about 0.7% of the 17 million new passenger vehicles sold in the US (Carley et al, 2016). In California, where PEV promotion activities are arguably the best developed, the PEV penetration rate (about 3%) is much higher than the national average, but well below the 18% level that CARB projects for 2025 due to the ZEV regulation. PEV sales in the Northeastern states are well below the California sales rate. In 2014 California alone

accounted for more than one third of PEV sales in the United States (National Research Council, 2015a, 42).

The National Research Council (2015a) undertook a major study of the obstacles to commercialization of PEVs, and highlighted the following key factors: most consumers are satisfied with their gasoline-powered cars and light trucks; the perceived financial costs of PEVs (e.g., higher purchase price and questionable resale value) are worrisome relative to the perceived financial benefits (e.g., savings in fuel and lower repair costs); the nonmonetary advantages of PEVs (e.g., quieter ride, acceleration capability, and sustainability profile) are less salient than the nonmonetary concerns (e.g., the limited driving range of BEVs, a perceived shortage of recharging infrastructure, and long recharging times); complexity and incompatibility concerns about making the transition to a PEV (e.g., perceived difficulty in obtaining permits for at-home installation of charging equipment, the need to figure out whether proprietary charging stations and incompatible chargers or plug types will be a problem, and uncertainty about the payment methods for electricity purchases); perceived difficulty in obtaining a test drive of a BEV or PHEV; the limited visibility of PEVs and charging infrastructure in most communities; and the lack of consumer awareness of the many federal, state and local incentives for purchase and use of PEVs.

A recent Harris survey of 1,052 US residents found that 67% of respondents don't know anyone who has owned a BEV, PHEV or even a conventional hybrid-electric vehicle like the Prius. The survey demonstrated that misperceptions of the PHEV were particularly severe, as the average respondent underestimated the typical driving range of a PHEV by more than 50% (Harris,

2016).

Since the ZEV regulation was amended by CARB in January 2012, three new developments have made it less likely that consumers will consider purchasing a PEV in the near future. Each of these developments weakens the financial rationale for a PEV purchase.

First, in 2012 average fuel prices were approaching \$4 per gallon and were expected to continue their upward march. But, the unexpected happened. Due to rapid changes in global oil markets (e.g., the shale revolution in North America and a slowdown in the rate of growth of China's economy), fuel prices have declined by almost 50%, and forecasters expect average fuel prices in the US to remain below \$3.00 per gallon through 2025. Fuel prices in California tend to be significantly above the national average and the rate of decline in fuel prices has been lower in California. Low fuel prices are known to weaken consumer interest in alternative technology vehicles while hurting the resale values of those vehicles (Carley et al, 2016; Sawyers, 2016).

Second, the NHTSA and EPA programs are increasing the average fuel efficiency of gasoline vehicles. As the average fuel efficiency of passenger vehicles increases to more than 40 miles per gallon in 2025 (measured as on-road fuel economy), the incremental fuel savings from operating a PEV diminish (Carley et al, 2016).

Finally, although there has been an encouraging reduction in the average cost of producing a PEV (Nykqvist and Nilsson, 2015; Clark and Campbell, 2016), and significant declines in retail pricing (for purchase or lease) of PEVs, the future of federal and state tax incentives for

purchasing PEVs is in doubt. Some projections suggest that the generous federal income tax credit for PEVs (up to \$7,500 per vehicle) will begin to phase out for manufacturers before 2025, when the ZEV regulations become most stringent (EEE Inc., 2014; National Research Council, 2015a). The federal tax credit for installation of home recharging stations has already been terminated. Some states (Colorado, Connecticut and Massachusetts) have recently added PEV incentives but other states (California, Georgia and Illinois) have terminated or scaled back their incentive programs to purchase PEVs. Some states are actually taxing PEVs on the basis that PEV owners should contribute funds for road maintenance and repair, though this basis has been criticized (National Research Council, 2015a).

While many forces are operating against commercialization of PEVs, both the National Research Council (2015a) and Carley et al (2016) discuss a variety of complementary policies that can be adopted by governments at all levels to accelerate the commercialization process. A coalition of the ZEV states has developed an MOU to push commercialization of PEVs through new policies. If such policies are not adopted, the ZEV requirements could become quite onerous.

4. Will the ZEV Requirements Reduce Emissions of Greenhouse Gases?

Not necessarily (see generally, Linn and McConnell, 2013). Automakers are allowed to count ZEVs in their compliance calculations for the NHTSA and EPA performance standards. Indeed, the federal programs provide temporary bonus credits to automakers that comply with PEVs and other advanced technology vehicles, and those bonus credits may cause a net increase in GHG emissions compared to the rate of emissions without bonus credits (Jenn et al, 2016). For

manufacturers who are constrained by the federal CAFE and GHG programs, each sale of a ZEV permits that manufacturer to sell another vehicle that has relatively low fuel economy or a high rate of GHG emissions (National Research Council, 2015a; Carley et al, 2016).

I am aware of no serious analysis showing that the ZEV program will cause a significant reduction in GHG emissions on a national basis. An earlier study of CARB's GHG program projected that the program would do far less to reduce GHG emissions than anticipated, since the CARB GHG program is nested within the increasingly stringent national CAFÉ program (Goulder et al, 2012). A similar analysis needs to be conducted for the nested ZEV program.

Proponents of the ZEV program argue that, even if the ZEV requirements do not reduce GHGs in the short run (due to the compliance averaging in the federal program), the ZEV requirements should demonstrate innovative technology that will allow the federal standards to be tightened in the long run (after 2025) (Sperling, 2014). The innovation argument has some merit, but there are a variety of public policies that can be employed to boost innovation and commercialization of advanced technology vehicles. The U.S. Department of Energy has a substantial R&D program underway to foster the commercialization of PEVs and FCVs. Several small countries (e.g., Norway and the Netherlands) have made more progress than California in commercializing PEVs (measured by the PEV share of new vehicle sales), yet those countries do not have ZEV requirements (e.g., see Holtmark and Skonhøft, 2014). Indeed, no other jurisdiction in the world has imposed ZEV requirements on automakers (Carley et al, 2016), though I have heard that the Canadian province of Quebec and the European Commission are considering ZEV-like programs. Given that the ZEV requirements will impose significant costs on automakers,

dealers, and consumers yet may not reduce GHG emissions significantly, I recommend that the federal midterm review re-examine the ZEV requirements.

5. Did the Obama administration use EPA's authority under the Clean Air Act to coordinate the ZEV requirements with the EPA and NHTSA regulatory programs?

No, not explicitly. During the 2009-2012 period, the Obama administration sought to harmonize regulatory requirements so that automakers could comply with the three regulatory programs (the NHTSA CAFE standards and the EPA and CARB GHG standards) by producing one fleet of vehicles on a national basis. The harmonization effort was sometimes called a uniform national program, and it was an appealing concept to automakers, dealers, and other stakeholders.

For reasons that are not entirely clear, the ZEV program was never formally incorporated into the harmonization effort. NHTSA and EPA did not incorporate CARB's 2012 ZEV regulation into the baseline vehicle fleet when the federal standards for 2017-2025 were analyzed. Nor did CARB consider the federal programs when the 2012 ZEV amendments were enacted, in part because the 2017-2025 federal rulemaking was completed after the 2012 ZEV amendments were finalized in January 2012.

Nonetheless, there are some fragmentary provisions that seem to link the ZEV program to the federal programs. For example, the federal programs for model years 2017-2025 provide bonus compliance credits for vehicle manufacturers that choose to offer PEVs and other advanced technology vehicles. Those bonus PEV credits were never justified by any cost-benefit analysis,

but the federal schedule calls for a phase out of those bonus credits just as the stringency of the ZEV requirements begin to intensify (Carley et al, 2016). Moreover, the EPA program is not yet penalizing PEVs for emissions that they may induce at the electric powerpoint, which causes PEVs to be a somewhat more attractive compliance choice for automakers than they would be if upstream emissions from PEVs were counted against PEVs. For a temporary period, CARB also provides limited ZEV credits to automakers that overcomply with the federal GHG requirements.

Each of these fragmentary provisions suggests that there was some recognition in 2012 that the ZEV and federal programs needed to be coordinated. Nonetheless, there is no careful analysis in any EPA, NHTSA or CARB document that coherently explains why it makes sense to impose the ZEV requirements on automakers, given that those same automakers are already subject to the 2017-2025 NHTSA and EPA/CARB GHG requirements. Specifically, the incremental costs and benefits of the ZEV program on a national basis, over and above the federal programs, have not yet been computed by the federal government or CARB.

6. From a technology perspective, do the federal regulations push automakers in a different direction than the ZEV requirements?

Yes, and the conflicts between technological pathways are becoming more apparent as the more stringent compliance deadlines draw closer.

The NHTSA and EPA regulations are performance standards that induce vehicle manufacturers to compare fuel-saving technologies in terms of cost-effectiveness. A technology with a good

(low) cost-effectiveness ratio is favored over a technology with a poor (high) cost-effectiveness ratio. The OMEGA and Volpe simulation models used by EPA and NHTSA, respectively, are designed to help vehicle manufacturers find combinations of technologies (sometimes called technological pathways) that will achieve compliance with the federal programs at minimum cost to automakers and consumers.

Both NHTSA and EPA, backed by a recent report from the National Research Council (2015b), have stressed that large-volume production of PEVs and FCVs will not be necessary to meet the federal requirements. A series of refinements to the gasoline-powered vehicle (e.g., transmission refinements, small turbocharged gasoline engines, various degrees of downweighting, and mild-hybrid concepts such as stop/start systems) are believed to be sufficient for many of the automakers to achieve federal compliance through model year 2025. In other words, PEVs and FCVs are simply not cost-effective technologies compared to the large suite of technologies that can be deployed to meet the 2025 federal requirements (National Research Council, 2015b).

The ZEV regulation is also a performance standard but it has been designed differently and more prescriptively than the federal performance standards. Automakers earn no ZEV credits for making investments in small turbocharged engines, lightweight materials, stop-start systems or even full conventional hybrids such as the Toyota Prius (though the Prius did earn some ZEV credits in earlier years). As a practical matter, it appears that only offerings of BEVs, PHEVs and FCVs will earn ZEV credits. And CARB has designed the 2018-2025 requirements so that most automakers cannot achieve compliance entirely with PHEVs. In other words, each major automaker's compliance plan must include at least a minimum number of BEVs or FCVs.

In effect, the federal programs are inducing automakers to make large investments in advanced gasoline technologies but those investments will not help companies comply with the ZEV requirements -- except for a brief period when overcompliance with the federal standard does generate some ZEV credits. Meanwhile, the ZEV requirements -- which cover about 28% of the new vehicle fleet nationally -- appear to require automakers to make large investments in entirely new propulsion systems that are intended to replace gasoline propulsion systems. From an engineering-economics perspective, the following fundamental question needs to be addressed in the federal midterm review: Does it make sense to require automakers to make investments in refinements to the internal combustion engine if California and nine other states are determined to require automakers to abandon the internal combustion engine in favor of BEVs or FCVs?

7. Does the draft TAR (EPA/DOT/CARB, 2016) provide a technical and economic foundation for regulators at EPA, NHTSA and CARB to consider regulatory-reform options that might coordinate the ZEV program with the federal programs?

As currently organized, the draft TAR appears to have the limited purpose of helping EPA and NHTSA decide whether to retain or refine the model year 2022-2025 federal performance standards. There is no indication that EPA, NHTSA and CARB are planning a regulatory deliberation that will seek to explicitly harmonize the ZEV regulation with the federal programs. However, CARB is now conducting its own review of the ZEV program (CARB, 2016) and the results of that review, expected at the end of calendar year 2016, could lead to a recognition at

CARB and/or at EPA/NHTSA that a more formal coordination effort is required. The draft TAR does contain a careful analysis of the technology costs for PEVs and FCVs, and that information is likely to be useful, once it is refined based on public comment.

A careful reader of the draft TAR will recognize that the EPA and NHTSA modeling are not consistent in the way that they are addressing the ZEV requirements. Like it did in 2012, NHTSA, through its Volpe modeling, proceeds as if the ZEV program does not exist. In 2012 EPA's OMEGA modeling also did not account for the ZEV requirements, but the EPA modeling in the 2016 draft TAR has moved in a different direction.

Specifically, instead of framing the ZEV regulation as a policy supplement to the federal programs (through exercise of EPA's waiver authority), the EPA modeling treats the ZEV regulation as an external influence on the baseline fleet of vehicles for model years 2022-2025, where the baseline fleet is the projected fleet of vehicles that automakers will sell if the federal standards are frozen at 2021 levels. The rate of GHG emissions in the baseline fleet is lower with inclusion of the ZEV regulation (than the rate would have been without the ZEV regulation) because PEVs reduce GHG emissions. As a result, EPA's GHG standards for 2022-2025 are estimated to be less costly for automakers. The draft TAR explains that the incremental costs of the 2022-2025 federal standards are estimated to be lower by EPA than NHTSA because EPA's modeling allows the ZEV regulation to influence the baseline fleet while the NHTSA modeling does not incorporate the ZEV program in the baseline.

The costs of the ZEV program are not presented in the draft TAR. The GHG emissions benefits

of the ZEV regulation appear to be incorporated in the EPA modeling but they are not isolated explicitly.

A close look at the volume of PEVs in the EPA baseline fleet reveals that EPA has made some strong assumptions. The draft TAR projects that the number of PEVs sold without ZEV regulation will continue to grow significantly through 2025, presumably due to market forces and state/federal incentives/subsidies. This is a questionable assumption given that gasoline prices are not expected to grow rapidly (thereby restraining consumer interest in PEVs), and some of the federal and state incentives for PEVs and FCVs are likely to be lessened or removed by 2025. Moreover, in the absence of the ZEV requirements, Tesla's business model would be adversely affected (i.e., Tesla cannot sell ZEV credits at \$5,000+ per credit to other automakers if the ZEV program does not exist) (Knittel, 2013), and many of the major automakers might diminish or terminate their PEV offerings if the ZEV regulation did not exist (National Research Council, 2015a, 6). Thus, most of the volume of PEVs projected in the draft TAR for the baseline model-year 2025 fleet (1.2% of national vehicle sales) arguably should be attributed to the ZEV regulation rather than market forces. Moreover, the total number of PEVs projected for 2025 in the draft TAR (3.0% of national vehicle sales) may not be consistent with the PEV forecasts for California made by CARB in 2012 and 2016, and that potential discrepancy needs to be clarified or resolved. Thus, some subtle reframing and reconsideration of the projected PEV volumes is necessary if decision makers are to use information in the TAR in an analysis of the relative magnitude of the incremental costs and benefits of the ZEV regulation.

8. Would it be prudent for Congress to authorize an independent analysis of the interaction

of the ZEV program with the federal programs?

A useful supplementary analysis of the ZEV regulation in the final TAR might proceed as follows. Start with the NHTSA approach to the baseline fleet, which excludes consideration of the ZEV regulation in the projection of the baseline fleet. Estimate the costs and benefits of the MY 2022-2025 federal standards compared to the ZEV-less baseline fleet. Then, with EPA's waiver authority as the policy context (since the waiver for California could be withdrawn or extended), compute the incremental costs and benefits of the ZEV regulation, given that the MY 2022-2025 EPA and NHTSA standards take effect, whether in their current or revised form.

Since the incremental assessment of the ZEV regulation is likely to raise some tensions among policy officials at CARB, EPA and NHTSA, it might be wise for the U.S. Congress to direct that the incremental assessment of the ZEV regulation be performed by an independent body such as the General Accountability Office, the Congressional Budget Office or the National Research Council. An incremental assessment of the ZEV regulation will be complex and will likely take at least six months to complete (under optimistic circumstances). Thus, Congress needs to act promptly to ensure that the incremental ZEV assessment does not unduly slow the pace of the midterm review.

References

- California Air Resources Board. 2011. Advanced Clean Cars: 2012 Proposed Amendments to the California Zero Emission Vehicle Program Regulations. Staff Report: Initial Statement of Reasons, December 7.
- California Air Resources Board. 2012. Advanced Clean Cars. January.
https://www.arb.ca.gov/msprog/consumer_info/advanced_clean_cars/consumer_acc.htm
- California Air Resources Board. 2016. Mobile Source Strategy.
- Carley, S, Betts NM, Graham, JD. 2011. Innovation in the Auto Industry: The Role of the US Environmental Protection Agency. *Duke Environmental Law and Policy Forum*. 21, 367-399.
- Carley, S, Duncan, D, Esposito, D, Graham, JD. 2016. Rethinking Auto Fuel Economy Policy: Technical and Policy Suggestions for the 2016-2017 Midterm Reviews. School of Public and Environmental Affairs. Indiana University. Bloomington, Indiana. February.
- Clark, P, Campbell, P. 2016. Pressure on the Pump. *Financial Times*, August 31, 7.
- Clark-Sutton, Kyle, Siddiki, Saba, Carley, Sanya, Wanner, Celeste, Rupp, John, Graham, John D., "Plug-in electric vehicle readiness: Rating cities in the United States", *The Electricity Journal*, 2016, doi:10.1013/j.tej.2015.12.006.
- Edelstein, S. 2015. Why Tesla Wants Stricter Emissions Rules. *Christian Science Monitor*. June 20. www.csmonitor.com/Business/In-Gear/2015/0620/why-Tesla-Wants-Stricter-Emissions-Rules.
- Energy Environmental Economics (EEE) Inc. 2014. California Transportation Electrification Assessment. Phase 2: Grid Impacts. October 23.
- Environmental Protection Agency. 2012. EPA Decision to Grant California's Request for Waiver of Preemption for its Advanced Clean Car Program. Office of Transportation and Air Quality. EPA-420-F-12-083, December.
- Environmental Protection Agency/Department of Transportation/California Air Resources Board. 2016. Draft Technical Assessment Report of Greenhouse Gas Emissions and Fuel Economy Standards for Model Year 2022-2025 Cars and Light Trucks.
- Goulder, LH, Jacobson, MR, Van Benthem, AA. 2012. Unintended Consequences from Nested State and Federal Regulations: The Case of the Pavley Greenhouse-Gas-Per-Mile Limits. *Journal of Environmental Economics and Management*. 63(2), 187-207.
- Graham, JD. 2008. Saving Lives through Administrative Law and Economics. *University of Pennsylvania Law Review*. 157(2), December, 474-480.

Graham, JD. 2010. *Bush on the Home Front: Domestic Policy Triumphs and Setbacks*. Indiana University Press. Bloomington, Indiana.

Graham, JD. 2012. Hearing on Office of Information and Regulatory Affairs: Federal Regulations and Regulatory Reform under the Obama Administration. Subcommittee Courts Commercial and Administrative Law, Committee on Judiciary, U.S. House of Representatives, United States Congress, March 21.

Graham, JD. 2016. *Obama on the Home Front: Domestic Policy Triumphs and Setbacks*. Indiana University Press, Bloomington, Indiana.

Harris Survey. 2016. Consumers Unclear on Plug-In Hybrid Benefits, Poll Finds. *Automotive News*. May 30, 28.

Jenn, A, Azevedo, IML, Michalek, JJ, 2016. Unintended Consequences: Why U.S. Alternative Fuel Vehicle Adoption Increases Fleet Gasoline Consumption and Greenhouse Gas Emissions under Corporate Average Fuel Economy Policy and Greenhouse Emissions Standards. *Environmental Science and Technology*. 50(5), 2165-2174

Knittel, C. 2014. California's Auto Emissions Policy Hits a Tesla Pothole. *Wall Street Journal*. February 15-16, A15.

Linn, J, McConnell, V. 2013. How Electric Cars Can Increase Greenhouse Gas Emissions. *Resources*. Resources for the Future, Washington, DC, 184, 33-37.

Lutsey, N, Searle, S, Chambliss, S, Bandivadekar, A. 2015. Assessment of Leading Electric Vehicle Promotion Activities in U. S. Cities. White Paper. International Council on Clean Transportation. July.

Michalek, JJ, Chester, M, Jaramillo, P, Samaress, C, Shiau, CSN, Lave, LB. 2011. Valuation of Plug-In Vehicle Lifecycle Emissions and Oil-Displacement Benefits. *PNAS*. 108(4), 16554-16558.

National Research Council, 2015a. *Overcoming Barriers to Deployment of Plug-In Electric Vehicles*. National Academy Press, Washington, DC.

National Research Council, 2015b. *Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles*. National Academy Press, Washington, DC.

Nykqvist, B, Nilsson, M. 2015. Rapidly Falling Costs of Battery Packs for Electric Vehicles. *Nature Climate Change*. 5, 329-332.

Sawyers, A. 2016. Cheap Gas Hits Hybrid, EV Residuals. *Automotive News*. February 1.

Shulock, C. 2016. *Manufacturer Sales Under the Zero Emission Regulation: 2012 Expectations and Governors' Commitments Versus Today's Likely Outcomes*. Report Prepared for the Natural

Resources Defense Council. July 21.

Sperling, D. 2014. The Secret to Saving the Automotive Revolution. Wall Street Journal. May 23.

Woodyard, C, Snavely, B, Bomey, N. 2013. Tesla Shares Sizzle on Hot Profit and Hotter Review. USA Today. May 14, 5B.

Mr. BURGESS. The Chair thanks the gentleman. The Chair recognizes Mr. German, 5 minutes to summarize your opening statement, please.

STATEMENT OF JOHN GERMAN

Mr. GERMAN. Mr. Chairman, good morning. My name is John German. I am a senior fellow at the International Council on Clean Transportation with primary responsibility for technology, innovation and U.S. policy development. Thank you for the opportunity to appear before the committee, present our views on vehicles and technology and how they relate to the midterm review of the CAFE and greenhouse gas standards.

I have been actively involved with vehicle technology and efficiency for 40 years, half of that time working for auto manufacturers Chrysler and Honda, the remainder with EPA and ICCT. Over the course of my career I have seen initial cost estimates for complying with emissions and efficiency requirements consistently overstated. Not some of the time or even most of the time, but all of the time.

The reason, technology innovation that is left out of the forecast, in part because the direction, pace and cost of innovation is hard to predict, and in part because there is so much at stake that everyone involved has an incentive to focus on what is already known. In my experience, the single most important factor in the accuracy of cost-benefit projections is the use of the latest technology data. Using older data or implicitly assuming no further innovation will occur guarantees that the cost in meeting the standard will be overstated. This is even more true now because the pace of technology development is accelerating, driven by rapid advances in computer-aided design, computer simulations and onboard computer controls.

In collaboration with engineers and analysts from major automotive suppliers, ICCT is producing a series of papers assessing technology development since the analyses for the 2017 to 2025 standards were conducted 4 to 5 years ago. These assessments cover new and improved designs, cost of production, and consumer acceptance.

The improvement in vehicle efficiency technology over the last 5 years has been astonishing. Significant technologies that were not included in the 2025 rule, but which automakers already have in production or have production plans for include naturally aspirated engines with higher efficiency Atkinson cycle and high compression ratios, dynamic cylinder deactivation that can deactivate each cylinder every other stroke, higher efficiency Miller cycle for turbo-charged engines, variable compression ratio, electric compressors to assist turbo-charged engines or eBoost, less expensive 48-volt hybrid systems, continuously variable transmission improvements, and major advancements in lightweight materials and part optimization. These developments will make it easier and cheaper to meet the standards that was projected in the rulemaking.

The agencies extensively updated their technology analyses for the draft Technical Assessment Report released this past July. They also expanded their use of rigorous peer-reviewed teardown cost studies which is the method specifically endorsed in the 2015

National Academies of Science report. Still, despite all the updates the agencies did not include all of the technology improvements that are already happening in the market. Thus, the cost estimates in the TAR while much improved over the rulemaking are still somewhat overstated.

The Novation Analytics study prepared for the vehicle manufacturers associations is an example of a study that implicitly assumes there will be no more innovation. While this is an excellent study of 2014 technology, evaluated only technologies included in the rulemaking 5 years ago, and it also assumed that the average vehicles in 2025 would be similar to the best vehicles in production in 2014.

The older technologies that were considered by Novation ignores recent innovations and artificially restricts the improvements available from conventional technology, forcing additional hybrids and plug-in vehicles to make up the shortfall. Simply put, ICCT's analysis of advanced conditional technologies shows that automakers will not need to rely on hybrids and plug-ins to meet the 2025 standards. Moreover, the fuel savings from these conventional technologies will produce a net monthly gain for most consumers in the low gas price scenarios.

And they come with other benefits that consumers value. Turbo-charged engines deliver more torque and better acceleration at low engine speeds, more transmission gears improve launch and are quieter on the highway, weight reduction improves acceleration, ride, handling, braking, and payload and tow capacity. This isn't merely theoretical. Ford's F-150 buyers aren't being forced to take the V-6 EcoBoost engine over the V-8. Almost half of F-150 buyers willingly pay an extra \$600 for it.

To sum up, the agencies' technology forecast for the 2025 rule have proved to be careful, prudent, and like all technology forecasts I have seen over the last 40 years a bit too conservative. The TAR though improved will most likely turn out the same. Thank you again for inviting me to testify here. I will be happy to answer any questions.

[The prepared statement of Mr. German follows:]

**Statement of John German
Senior Fellow
International Council on Clean Transportation (ICCT)**

Before the

**Subcommittee on Commerce, Manufacturing, and Trade and the Subcommittee on
Energy and Power**

Committee on Energy and Commerce

U.S. House of Representatives

**Midterm Review and an Update on the Corporate Average Fuel Economy Program
and Greenhouse Gas Emissions Standards for Motor Vehicles**

September 22, 2016

Mr. Chairman, good morning. My name is John German, Senior Fellow and Program Director for the International Council on Clean Transportation (ICCT), with primary responsibility for technology innovation and U.S. policy development. I have been actively involved with vehicle technology and efficiency for 40 years. In earlier stages of my career, I spent 8 years in Powertrain Engineering at Chrysler working on fuel economy issues, followed by 13 years doing research and writing regulations for EPA's Office of Mobile Sources and 11 years as Manager of Environmental and Energy Analyses for American Honda Motor Company. To support my credentials, I was the first recipient of the Barry D. McNutt award, presented annually by SAE for Excellence in Automotive Policy Analysis. Thank you for the opportunity to appear before the House Subcommittees on Commerce, Manufacturing, and Trade and Energy and Power to present our views on vehicles and technology and how they relate to the mid-term review of the CAFE and greenhouse gas standards.

SUMMARY

Forecasts always understate technology development and overstate costs. This is because there is a constant stream of innovation and new technology development. Because these technologies are unknown, the single most important factor in the accuracy of cost and benefit projections is the use of the latest, most up to date technology data. Using older data or implicitly assuming the end of innovation has been reached guarantees that the cost of meeting the standard will be overstated. This is especially important because the pace of technology development is actually accelerating, due to advances in computer aided design, computer simulations, and onboard computer controls. To evaluate technology progress, ICCT has collaborated with automotive suppliers on a series of papers on technology developments since the analyses conducted for the 2017-25 standards four to five years ago. Technology developments over the last 5 years have been astonishing. Technologies already in production or for which production plans have been announced, even though they were not anticipated or even considered in the supporting analyses for the 2017-2025 rule, include higher efficiency naturally aspirated engines with Atkinson cycle and very high compression ratios, dynamic cylinder deactivation that can deactivate each cylinder every other stroke, Miller cycle for turbocharged engines, variable compression ratio, electric compressors to assist turbocharged engines (e-boost), less expensive 48v hybrid systems, continuously variable transmission improvements, and major advances in lightweight materials and part optimization. These developments will make it easier and cheaper to meet the standards than was projected in the rulemaking.

The agencies updated technology analyses in the draft TAR include most of these improvements, but not all. Thus, the cost estimates in the TAR, while much improved over the rulemaking, are still overstated.

The new technologies also provide many benefits desired by consumers, in addition to the fuel savings. For example, turbochargers have better low rpm torque for the same high rpm power, transmissions with more speeds improve launch and are quieter on the highway, and weight reduction improves acceleration, ride, handling, braking, and tow capacity. The value customers place on these benefits is usually not accounted for.

TECHNOLOGY

During the course of my 40-year career, initial cost estimates for complying with emissions and efficiency requirements have consistently been overstated. Not some of the time, or even most of the time, but all of the time. While he said it in an entirely different context, Donald Rumsfeld hit the nail on the head:

"there are known knowns; there are things that we know that we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns, the ones we don't know we don't know."

To relate this specifically to projections of vehicle efficiency and cost, studies and reports usually do a good job laying out the things that we know, i.e. the technologies that are already in use. While most reports stop here, the better reports also attempt to lay out the known unknowns, such as technology that is already in development somewhere and estimates of cost reductions due to learning and volume. But unknown unknowns, i.e., technology innovations, are almost never assessed, even though there is a long history of constant technology innovation. There is a good reason for this: they are unknown. What this means is that **the single most important factor in the accuracy of cost and benefit projections is the use of the latest, most up to date technology data and developments.** Using older data guarantees that the cost of meeting the standard will be overstated, as it does not include more recent technology developments and thus must default to more expensive technology, such as full hybrids. Similarly, assuming that the end

of innovation has been reached and basing projections on what is in production today ignores technology developments in process and overstates the cost of future compliance.

Contrary to the common perception that the internal combustion engine is at the end of its development, the pace of technology innovation is accelerating. This is because there has been a genuine technology revolution: computers. Computer simulations and computer-aided design are enabling vastly improved designs and technologies. On-board computer controls provide unprecedented integration of engine, transmission, and hybrid operation. Instead of slowing down, the pace of technology development just keeps accelerating.

Computer simulations will especially impact lightweight material design. In the past, interactions between the thousands of parts on the vehicles and their impacts on safety, ride, noise, and vibration were impossible to predict. Optimization of materials was a long, slow process of gradually changing a few parts at a time to avoid unanticipated problems. Secondary weight reductions were similarly difficult to achieve. The recent development of sophisticated and accurate vehicle simulations is opening up a new world. The initial use of these models was to improve safety design. The simulations are so effective that 5-star crash ratings became almost universal and NHTSA had to revise their rating criteria for the 2011 model year. The simulations are continuing to rapidly improve, to the point where they are being used to simultaneously optimize the material composition, shape, and thickness of every individual part, including secondary weight reductions.

The technology assessments performed by the agencies to inform the 2017–2025 rule were conducted four to five years ago.¹ In preparation for the mid-term review of the U.S. 2017–2025 CAFE and GHG light-duty vehicle standards, ICCT has collaborated with automotive suppliers on a series of working papers evaluating technology progress and new developments in engines, transmissions, vehicle body design and lightweighting, and other measures that have occurred since then. The papers combine the ICCT's extensive analytical capacity and expertise in vehicle technology with the practical knowledge and experience of auto suppliers. Each paper evaluates:

- How the current rate of progress (cost, benefits, market penetration) compares to projections in the rule
- Recent technology developments that were not considered in the rule and how they impact cost and benefits
- Customer-acceptance issues, such as real-world fuel economy, performance, drivability, reliability, and safety

Eaton, Ricardo, Johnson Controls, Honeywell, ITB, BorgWarner, Dana, FEV, Aluminum Association, Detroit Materials, and SABIC have contributed to one or more of the technology papers. Papers on the following technologies are part of this series (three of the papers have been published, with publication of the rest expected by the end of 2016:

¹ U.S. EPA & NHTSA, "Joint Technical Support Document: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards" (2012). <https://www3.epa.gov/otaq/climate/regs-light-duty.htm#2017-2025> U.S. NHTSA, "Corporate Average Fuel Economy for MY 2017-MY 2025 Passenger Cars and Light Trucks: Final Regulatory Impact Analysis" (2012). <http://www.nhtsa.gov/fuel-economy>

- Hybrid vehicles²
- Downsized, boosted gasoline engines
- Naturally aspirated gasoline engines, including cylinder deactivation³
- Transmissions⁴
- Lightweighting
- Thermal management
- Diesel engines

Technology developments over the last 5 years have been astonishing. For example, the following technologies are already in production or production plans have been announced, even though were not anticipated or even considered in the supporting analyses for the 2017-2025 rule:

- **High-efficiency naturally aspirated engines** with Atkinson cycle and high compression ratio. The rulemaking assessments found that naturally aspirated engines would not be able to compete with turbocharged, downsized engines and would be almost completely replaced with turbocharged engines by 2025. The only exception was the continued use of Atkinson cycle engines on full hybrids (5% of the

² John German (ICCT). Hybrid vehicles: Trends in technology development and cost reduction, July 23, 2015. <http://www.theicct.org/hybrid-vehicles-trends-technology-development-and-cost-reduction>

³ Aaron Isenstadt and John German (ICCT), Mihai Dorobantu (Eaton). Naturally aspirated gasoline engines and cylinder deactivation, June 21, 2016. <http://www.theicct.org/naturally-aspirated-gas-engines-201606>

⁴ Aaron Isenstadt and John German (ICCT), Mark Burd and Ed Greif (Dana Corporation). Transmissions, August 29, 2016. <http://www.theicct.org/PV-technology-transmissions-201608>

fleet), where the electric motor could offset the performance tradeoffs with the Atkinson cycle engine. However, Mazda has introduced a very high (13.0:1) compression ratio naturally aspirated engine with exceptional efficiency and is already using this on most of their vehicles.⁵ Toyota has found ways to offset the performance losses with its Atkinson cycle engine, using variable valve timing and other techniques, and is expanding the use of Atkinson cycle engines to non-hybrid vehicles.⁶ Toyota has announced that this technology will be in production soon.

- **Dynamic cylinder deactivation.** Cylinder deactivation was considered by the Agencies in the rulemaking, but only deactivation of groups of cylinders at a time. A new type of cylinder deactivation is in widespread development that allows each individual cylinder to be shut off every other revolution of the engine.⁷ This technique reduces noise and vibration, extending cylinder deactivation to lower engine rpms and allowing 4-cylinder and even 3-cylinder engines to use cylinder deactivation.

⁵ Goto et al. "The New Mazda Gasoline Engine Skyactiv-G." MTZ worldwide Issue no.: 2011-06: 40-46. Accessed June 2016. <http://www.atzonline.com/Artikel/3/13208/The-New-Mazda-Gasoline-Engine-Skyactiv-G.html>.

⁶ "Toyota claims record gasoline efficiency." *Ricardo Quarterly Review* Q2 2014, p. 4. Accessed June 2016 http://www.ricardo.com/Documents/RQ%20pdf/RQ%202014/RQ%20Q2%202014/RQ_Q2_2014_English.pdf.

⁷ Wilcutts, M., Switkes, J., Shost, M. and Tripathi, A., "Design and Benefits of Dynamic Skip Fire Strategies for Cylinder Deactivated Engines," *SAE Int. J. Engines* 6(1):2013, doi:10.4271/2013-01-0359.

Truett, Richard. "Cylinders take turns to deliver proper power." *Auto News* September 21, 2015. Accessed June 2016. <http://www.autonews.com/article/20150921/OEM06/309219978/cylinders-take-turns-to-deliver-proper-power>

"VW ACT Active Cylinder Management." *Automotive Expo*. YouTube, April 2014. Accessed June 2016. https://www.youtube.com/watch?v=_4AZbbBjqhM

Cecur, Majo, Veiga-Pagliari, D.R. "Dynamic Cylinder De-Activation (D-CDA)." PSA & Eaton. Presented at 24th Aachen Colloquium Automobile and Engine Technology. October 7, 2015.

- **Miller cycle** for turbocharged engines. This is basically the higher-efficiency Atkinson cycle concept extended to turbocharged engines. The performance tradeoff can be addressed by increasing the turbocharger boost. Miller cycle adds about 5% efficiency to a turbocharged engine at no cost, although there can be costs involved with increasing the turbocharger boost to compensate for the performance loss. If Miller cycle is combined with e-boost or 48v hybrids, these technologies provide the needed performance boost and the cost of Miller cycle becomes zero. The first Miller cycle application is in production on the new EA211 engine from VW.⁸
- **Variable Compression Ratio (VCR).** Higher compression ratio improves efficiency, but at high engine loads it increases detonation, which is especially a problem for boosted engines. Variable compression ratio (VCR) changes the engine's compression ratio to suit particular speeds and loads. The benefits of VCR overlap with those of Atkinson/Miller cycle, as both enable higher compression ratio. However, VCR does have one significant benefit over Miller cycle: it allows performance to be completely maintained at lower engine speeds. Thus, VCR may be a competitor to Miller cycle concepts in the long run, offering manufacturers more options to improve efficiency while maintaining performance. Nissan is

⁸ Eichler, F. et al (2016). *The New EA211 TSI® evo from Volkswagen*. Presented at the 37th International Vienna Motor Symposium, 28-29 April 2016.

"Audi introduces new high-efficiency 2.0L TFSI based on Miller cycle; 190 hp, 47 mpg," Green Car Congress, accessed 18 August 2016, <http://www.greencarcongress.com/2015/05/20150708-audi.html>

⁸ Ichiro Hirose (2016). *Mazda 2.5L SKYACTIV-G Engine with New Boosting Technology*. Presented at the 37th International Vienna Motor Symposium, 28-29 April 2016.

implementing the first VCR application in a production turbocharged engine in MY2017.⁹

- **E-boost.** These systems comprise a higher voltage electrical system (48 volt) used to provide power for a small electric compressor motor within a turbocharger. This either directly boosts the engine, or spins up the turbocharger to greatly reduce turbo lag. This increases the ability to downsize and downspeed the engine and also reduces backpressure.¹⁰ E-boost allows the use of larger turbines with lower backpressure, for a direct reduction in BSFC in addition to the benefits from engine downspeeding/downsizing. The first E-boost system application is in production on the 2017 Audi QS7.¹¹
- **48-volt hybrid systems.** Unlike expensive full hybrids, 48v hybrid systems are not designed to power the vehicle. The lack of a large electric motor and the correspondingly smaller battery greatly reduce the cost for this level of hybridization. The rulemaking considered 110-volt mild hybrid systems and projected that they would capture 17% of the market by 2025. However, 48v systems provide much of the same benefits at lower cost, as they stay below the 60v lethal threshold, also improving safety.¹² There are also excellent cost synergies

⁹ Nissan Global. (2016). Infiniti VC-T: The world's first production-ready variable compression ratio engine. August 14, 2016, <https://newsroom.nissan-global.com/releases/infiniti-vc-t-the-worlds-first-production-ready-variable-compression-ratio-engine>

¹⁰ BorgWarner (2015). *Technologies for enhanced fuel efficiency with engine boosting*. Presented at Automotive Megatrends USA 2015, 17 March 2015. Slide 26

¹¹ Stuart Birch. "Audi claims first production-boosting on 2017 SQ7," *Automotive Engineering*, March 6, 2016, <http://articles.sae.org/14662/>

¹² Alex Serrarens (2015). *Overview of 48V technologies, deployment and potentials*. Presented at Automotive Megatrends USA 2015, 17 March 2015.

with e-boost, as the same 48v controllers, inverters, and power electronics are used for both systems.

- **Continuously-variable transmissions (CVTs).** The rulemaking analyses found that CVTs would not be able to compete with other transmissions and would be completely replaced by 2025. However, certain long-standing design issues with CVTs have been resolved and the latest generation of CVTs have reduced internal friction, wider ratio spread, and increased torque capacity.¹³ These new CVT designs have efficiency similar to conventional automatics and are cheaper than either conventional automatics or dual-clutch automated manuals. As a result, the CVT market share has exploded, from 9% in 2012 to 18% in 2015.
- **Lightweighting.** Advances in modeling/simulation tools and joining techniques have opened the floodgates to unprecedented levels of material/design optimization. Suppliers are rapidly developing the advanced materials and methods for major lightweighting endeavors, as well as the computational tools for simulating full vehicles all the way down to nanoscopic material behavior. Many recent vehicle redesigns have reduced weight by at least 4%, already meeting or exceeding 2021 projections in the rule (table 1). There are numerous material improvements in development that were not considered in the rule, such as higher strength aluminum,¹⁴ improved joining techniques for mixed materials, third-

¹³ "Jatco CVT7." *Jatco Product Information*. <http://www.jatco.co.jp/ENGLISH/products/cvt/cvt7.html>. Accessed June 2016.

¹⁴ Richard Truett. "Novelis: Automakers test stronger aluminum." *Auto News*. August 10, 2015. Web. Accessed July 2016. <http://www.autonews.com/article/20150810/OEM01/308109982/novelis:-automakers-test-stronger-aluminum>

generation steels with higher strength and enhanced ductility,¹⁵ a new generation of ultra-high strength steel cast components, and metal/plastic hybrid components.¹⁶ Combined, weight reduction of about 15% should be feasible by 2025, at a cost of only about a third of the rulemaking cost projection.

Table 1: Sample of vehicle mass reductions

Vehicle make	Model year	Weight reduction (kg)*	Weight reduction (%)*	Designed market
Ford F150	2015	318	14%	US
Acura MDX	2014	111	5%	US
GM Cadillac CTS	2014	111	6%	US
Peugeot 308 SW Blue Hdi	2014	140	9%	EU
VW Golf TDI	2015	49	4%	EU
Audi Q7	2014	363	15%	US, EU
BMW i3 EV	2014	249	17%	US, EU
Land Rover Range Rover	2014	350	14%	US, EU
Porsche Cayenne	2012	181	8%	US, EU
Audi A8	2014	145	7%	US, EU
Audi A3	2014	80	6%	US, EU
Nissan Leaf	2012	80	5%	US, EU
Lamborghini Huracan	2015	78	5%	US, EU
Audi TT 3rd gen 2.0 TDI	2015	50	4%	US, EU

Production or near-production technology developments that have occurred since 2012 will make it easier and cheaper for manufacturers to comply with the 2022–2025 standards that are under review. And this does not include new technologies in

¹⁵ Ryan Gehm. "NanoSteel confident its new AHSS is ready for volume production." *Automotive Engineering*. July 17, 2016. Web. Accessed July 2016. <http://articles.sae.org/14908/>

¹⁶ Mana D. et.al "Body-in-white Reinforcements for Light-weight Automobiles", SAE technical paper # 2016-01-0399

Nagwanshi D. et.al, "Vehicle Lightweighting and Improved Crashworthiness – Plastic/Metal Hybrid Solutions for BIW", SPE ANTEC, technical program, 2016.

development, such as the VariGlide® Planetary Variator, which while unproven could improve transmission efficiency, reduce cost, and extend durability.

Novation Analytics Phase 1 Technology Assessment¹⁷

Novation's study for the Alliance of Automobile Manufacturers clearly defined what they did and didn't do, which I appreciate, but Novation did not actually evaluate technology potential. Instead, they simply duplicated the technology packages in the 2017-2025 rulemaking and compared them to current vehicles using these technologies. As a result, the study used both outdated technology assumptions and implicitly assumed there would be no technology innovations after 2014.

Novation's technology assessments did not incorporate projected improvements in each technology from 2014 to 2025, as EPA and NHTSA did in the rulemaking. Instead, Novation started with the 2014 distribution of engine efficiencies and assumed that the average efficiency of each technology in 2025 would be the same as the 90% percentile efficiency in 2014. The Novation study specifically states, "In the timeframe of the MYs 2012-2016 and MYs 2017-2025 rulemaking, however, it is not likely that the sales-weighted fleet performance will exceed the current boundaries established by the best in class vehicles utilizing many of the technologies listed above. This implicitly assumes that there will be no technology innovations beyond what was already incorporated into some vehicles in 2014.

¹⁷ Novation Analytics. Final Report - Technology Effectiveness – Phase I: Fleet-Level Assessment (version 1.1), prepared for: Alliance of Automobile Manufacturers Association of Global Automakers, October 19, 2015. <http://www.autoalliance.org/cafe/cafe-research-reports>

Given the history of constant technology innovation, this assumption is completely unjustified. It is essentially the same as saying that the iPhone6 was the best smart phone in the market in 2014, so in 2025 the average smart phone will be the same as the iPhone6. Applying this methodology to vehicle technology is no better than applying it to smart phones.

As a specific example of an unfounded assumption, Novation's study stated: "the current compression ignition (24-29 bar maximum BMEP diesel) can be used as a representative proxy as it is unlikely even an advanced SI package will exceed the current CI efficiency boundary." It is accurate that 2025 SI (spark ignited, or gasoline) engines must exceed the efficiency of current CI (compression ignition, or diesel) engines. But any competent analysis of upcoming powertrain technology (which includes transmissions and accessories, not just engines) finds that 2025 gasoline engine powertrains will exceed current diesel powertrain efficiency. Novation's assumption makes for a good sound bite, but it has no analytical basis. To illustrate the shortcomings of Novation's approach, Novation's found that the 90th percentile efficiency for naturally aspirated engines, which they used as the average efficiency for 2025 naturally aspirated engine, was 22.8% (with high-spread transmission without stop/start). However, Novation's own data showed that the 2014 Mazda SkyActiv engine already had an efficiency of 25.1%. This is 10% higher than Novation's 2025 estimate — and almost as high as the average 2014 diesel engine (26%) — with 11 years of improvements yet to come.

Another flaw is that Novation simply duplicated the technology set that was used in the rulemaking. As this technology set is 5 years old, Novation implicitly froze the level of innovation at the 2012 level. Not only did Novation ignore all future technology innovation, it also ignored all technology innovation that have occurred in the last 5 years.

Overall, there is some interesting information in the study on the efficiency of the 2014 fleet, but the Novation study violates both of the criteria for a good analysis: it uses old data (5-year old technology sets) and it assumes there will be no improvements beyond what was in the better vehicles in the 2014 fleet.

EPA/NHTSA Draft Technical Assessment Report (TAR)¹⁸

There is much to commend in the updated EPA and NHTSA analyses, as documented in the TAR. Both agencies have done massive amounts of work to update the technologies and the technology assessments since the 2017–2025 rulemaking. The most significant change was the addition of new highly-efficient, cost-effective naturally aspirated engines (i.e., high-compression Atkinson engines, like Mazda’s SkyActiv) in EPA’s analyses. This resulted in a reduction in the penetrations of turbo downsizing and hybridization for the EPA modeling. Both agencies also implemented a number of other updates, including:

- A more cost effective mild hybrid, based on a 48v system.
- Addition of Miller cycle turbocharged engines, based upon the engine map

¹⁸ Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022–2025

published by VW on their 2016 2.0L EA888 engine. This technology was applied to 4% of the 2025 fleet in EPA's OMEGA analysis.

- Addition of variable geometry turbocharges (VGT) on 24-bar turbocharging systems.
- Updated mass reduction costs, based on four independent teardown studies. At lower levels of mass reduction, these studies produced lower costs than the rulemaking estimates.
- Increased effectiveness of future 8-speed transmissions, as informed by benchmarking of multiple transmissions, published reports of future planned improvements by ZF, and results from EPA's new physics-based Alpha model.
- A significant reduction in battery cost estimates for EVs and PHEVs as a result of updated battery and motor sizing estimates, and the application of DOE's latest version of the BatPaC model.
- Improved on-cycle effectiveness estimates for stop-start, based on more recent implementations of the technology

Due to the improved technology and cost reductions since the rulemaking, the standards will be easier and cheaper to meet than originally anticipated. This is illustrated by EPA's technology forecasts in the TAR, which include only 4% penetration for Miller cycle and 7% weight reduction by 2025. If necessary, Miller cycle could be extended to all turbocharged engines (37% of the market forecast for 2025) and 15% weight reduction is also feasible by 2025, thus only a relatively small amount of these technologies are needed to meet the 2025 standards.

Another important finding from the TAR, which confirms a similar finding in the rulemaking, is that the MY2022–2025 standards are not dependent on any single technology. There are multiple promising technology pathways that have similar cost-effectiveness, and there are already several examples where different strategies employed by manufactures have produced competition in innovation, such as automatic transmissions versus CVTs, downsized turbocharger versus Atkinson cycle naturally aspirated, and high-strength steel versus aluminum.

The agencies are also to be commended for their expanded use of rigorous peer-reviewed “tear-down” cost studies. Although expensive to conduct, these studies are more accurate and far more transparent than the older method of surveying manufacturers. Note that the 2015 National Academy of Science report specifically endorsed tear-down studies as the most appropriate way to get at costs.

Still, despite all of their new work and all of the updates, the agencies are still behind what is already happening in the market. For example, the agencies did not explicitly model e-boost, variable compression ratio, or dynamic cylinder deactivation. This is understandable, as it is critical for the agencies to have a robust, defensible analysis. But it also means that the agencies are always going to be somewhat behind in their assessments of potentially promising technologies. This may be particularly a concern for the NHTSA results, as it appears that NHTSA used slightly older data for some of their analyses and did not model the new high compression ratio naturally aspirated engines. On the other hand, EPA and NHTSA show relatively similar results, even though they conducted fairly independent

analyses. This supports the robustness of the technology availability to comply with the 2025 standards.

Although the agencies' results are conservative, they are far more up to date and accurate than the Novation study.

CONSUMER IMPACTS

The argument is often raised that higher vehicle costs due to addition of efficiency technology will cause customers to keep their old vehicles longer, reducing the effectiveness of the standards and costing manufacturers sales. However, this argument is persuasive only if the technology does not deliver benefits desired by consumers. In fact, even at the current relatively low fuel prices, the monthly savings in fuel costs usually more than pays for the increase in the vehicle monthly payment.¹⁹ Most customers will recognize the improved vehicle fuel economy and will not balk at the increased vehicle price. It should be noted that the aggressive standards implemented from 2012 to 2016 coincided with the longest and strongest vehicle sales increase in history.

More importantly, many of the technologies required by the standards have other attributes that are highly desired by consumers. Turbocharged engines are downsized to

¹⁹ Tyler Comings, Avi Allison, Frank Ackerman, "Fueling Savings: Higher Fuel Economy Standards Result In Big Savings for Consumers", prepared for Consumer Reports by Synapse Energy Economics, September 7, 2016. <http://consumersunion.org/wp-content/uploads/2016/09/Fueling-Savings-Consumer-Savings-from-CAFE-2025-Final-1.pdf>
Fueling Savings: Higher Fuel Economy Standards Result In Big Savings for Consumers

deliver the same amount of power at high engine speeds. However, turbochargers have more power at low engine speeds and, thus, accelerate faster, climb steeper hills without having to downshift the transmission, and provide more towing ability. This effect was dramatically illustrated with a recent high-volume turbocharger application, the Ford 3.5L EcoBoost engine offered on their F150 pickup truck. The 3.5L V6 turbocharged engine was an optional engine on the F150. Ford charged an extra \$595 over the standard 5.0L V8 engine. Ford originally expected that 20% of customers would pay the additional \$595 for the smaller engine. The reality was that 45% of F150 customers paid \$595 for the 3.5L EcoBoost and sales were higher than the standard 5.0L V8 (the F150 offered two other engines that combined for about 15% of sales, with 40% for the 5.0L V8). Certainly the better efficiency of the smaller engine was desirable, but what most customers wanted was the higher low rpm torque and higher towing capacity of the 3.5L EcoBoost.

Many other engine technologies, such as gasoline direct injection, variable valve timing, variable valve lift, and cooled EGR, also provide improved vehicle performance in addition to the efficiency benefits. Thus, there are no consumer acceptance issues for these technologies.

New transmissions with more gear ratios and wider gear-ratio spread have major positives in addition to better fuel economy. Lower gears improve vehicle launch, a lower ratio for the top gear provides quieter operation on the highway, and more gears can better maintain both lower rpm for better fuel economy and higher rpm for faster acceleration. These advantages have contributed to the rapid adoption of more gear ratios in recent years.

Lightweighting has very large benefits, beyond fuel savings, that have substantial value to customers. These includes better acceleration, ride, handling, and braking, as well as higher towing and payload capacity. For the 2025 rule and in the TAR, EPA and NHTSA did not evaluate the value of these benefits to consumer, instead assigning the entire cost of lightweighting to fuel consumption/CO₂ reductions. This is not appropriate and dramatically understates the benefits of lightweighting to consumers and overstates the cost to reduce fuel consumption and CO₂.

This is supported by a 2015 report published by the National Academy of Sciences (NAS),²⁰ which projected that manufacturers will reduce light-truck mass by 20% in 2025, despite very high cost (\$1,617–\$2,343 for a 5,550 pound truck). They reached this determination because “implementation of mass reduction techniques can provide several benefits that might be attractive to an OEM”.

As a specific example, the official Ford website for their F150 pickup truck²¹ does not even mention improved fuel economy when discussing the aluminum body benefits on the front webpage:

“THE MATERIAL THAT MADE EVERY OTHER TRUCK HISTORY”

“The use of high-strength, military-grade, aluminum alloy not only makes F-150

²⁰ National Research Council. *Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles*. Washington, DC: The National Academies Press, 2015. doi:10.17226/21744. (see pp. 6-10, specifically).

²¹ <http://www.ford.com/trucks/f150/>

lighter and more agile than ever before, it's also one of the reasons it can haul and tow more than any other half-ton pickup. See the story of this revolutionary advance in truck manufacturing."

SAFETY

Safety should no longer be an issue, because the standards are now indexed to vehicle footprint. Older studies reported that reducing vehicle weight increased fatalities, but these studies inappropriately grouped the effects of vehicle size with weight and reported both effects as a weight effect. More recent studies by NHTSA and DRI have found that it was the smaller vehicle size that increased fatalities, not reducing weight.²² The footprint-based standards were deliberately designed to create a safer fleet, as they encourage larger but lighter vehicles and there is no longer any incentive to downsize vehicles. This is exactly what you want to reduce fatalities. The latest draft NHTSA report on the impacts of size and weight on fatalities found that if size is held constant, then the impacts of reducing weight on fatalities are statistically insignificant.²³

²² Updated Analysis of the Effects of Passenger Vehicle Size and Weight on Safety: Supplemental Results on the Sensitivity of the Estimates for 2002 to 2008 Calendar Year Data for 2000 to 2007 Model Year Light Passenger Vehicles to Induced-Exposure Data and Vehicle Size Variables, DRI-TM-12-09, R. M. Van Auken J. W. Zellner, February 2012

DRI, UPDATED ANALYSIS OF THE EFFECTS OF PASSENGER VEHICLE SIZE AND WEIGHT ON SAFETY, PHASE II: PRELIMINARY ANALYSIS BASED ON 2002 TO 2008 CALENDAR YEAR DATA FOR 2000 TO 2007 MODEL YEAR LIGHT PASSENGER VEHICLES, Volume I: Technical Report DRI-TR-12-01, R. M. Van Auken J. W. Zellner, January 2012

²³ NHTSA, Relationships between Fatality Risk, Mass, and Footprint in Model Year 2003-2010 Passenger Cars and LTVs, Preliminary Report, DOCKET NO. NHTSA-2016-0068 JUNE 2016

The draft NHTSA report also found that older data may not be representative of future vehicles subject to footprint-based standards:

(viii) "The vehicles manufactured in the 2003-2010 timeframe were not subject to a footprint-based fuel-economy standard. NHTSA and EPA expect that the attribute-based standard will affect the design of vehicles such that manufacturers may reduce mass while maintaining footprint more than has occurred prior to 2022-2025. Therefore, it is likely that the analysis for 2003-2010 vehicles may not be fully representative of those vehicles that interact with the existing fleet in 2022 and beyond."

An important factor that is rarely addressed is that future weight reductions will be accomplished primarily with the use of high strength steel and aluminum and with better vehicle design. High strength steel and aluminum both have better crash properties than standard steel. Reducing weight using these better materials will improve vehicle crash performance and reduce fatalities, even in small cars. For example, Honda has moved aggressively towards using HSS in small cars in part because of the safety benefits.²⁴

FULL HYBRIDS AND PLUG-IN VEHICLES

Much has been made of the market drop in full hybrid vehicles, corresponding to the drop

²⁴ "Honda Civic Captures AISI Great Designs in Steel Automotive Excellence Award", <http://www.theautochannel.com/news/2008/04/09/083742.html>

in fuel prices. While full hybrids are sensitive to fuel prices, this is a very expensive technology that is not typical of the technologies available to comply with the standards. Most technologies are much lower cost and will not engender the same consumer resistance. This includes 48v hybrids that are only about 40% of the cost of a full hybrid and are projected by both ICCT and the agencies to capture a much larger share of the market in 2025 than full hybrids.²⁵

The manufacturers have been quoting the Novation study results, which found that 30% full hybrids would be needed to meet the 2025 standards. However, this study is based on 2012 technology sets and also assumes little improvement in technologies from 2014 to 2025. The best way to find that a lot of full hybrids are needed is to use outdated data and assumptions that cause the amount of available conventional technology to run out. In reality, there are many technologies that have become available since 2012, which will allow the standards to be met without the need for full hybrids.

Neither full hybrids nor plug-in vehicles are needed to comply with the 2025 standards. Between the technologies that are already near production that were not included in the agencies' assessments in the TAR and the low penetration of Miller cycle and weight reduction projected for 2025, conventional technology will be more than enough for manufacturers to comply with the standards.

Plug-in vehicles required by California's ZEV mandate are built into the EPA Reference Case

²⁵ ICCT Hybrid paper 2015 and Draft Technical Assessment Report

fleet for the TAR. This is a constructive change from the assumptions in the 2017-2025 rule, as it ensures that EPA is not double-counting policy costs incurred by a different regulation (the ZEV mandate). These vehicles also make it easier for manufacturers to comply with the CAFE/CO₂ standards.

OFF-CYCLE CREDITS

The vehicle manufacturers have petitioned EPA to streamline the off-cycle credit approval process.²⁶ Due to the current lack of data on how vehicles are actually operated in the real world, approval of this petition would be counter-productive.

In theory, off-cycle credits are a good idea, as they encourage real-world fuel consumption reduction for technologies that are not fully included on the official test cycles. However, real-world benefits only accrue if double-counting is avoided and the amount of the real-world fuel consumption reduction is accurately measured. The problem is that there has not been any systematic study of driving conditions and consumer driving behavior for at least 25 years. This lack of data makes it difficult, if not impossible, to establish generic credits. It also provides an incentive for manufacturers to generate real world data on a biased sample of in-use vehicles, in order to obtain artificially large credits.

²⁶ Petition for Direct Final Rule with Regard to Various Aspects of the Corporate Average Fuel Economy Program and the Greenhouse Gas Program, Alliance of Automobile Manufacturers and the Association of Global Automakers, June 20, 2016.

The proper solution is for EPA to launch a collaborative data collection program, in cooperation with the manufacturers and the Department of Energy, to collect real world data representative of national driving behavior and conditions. This data set would allow EPA to establish standardized credits that would apply to all manufacturers and would not be subject to gaming. The ICCT would be happy to collaborate in such as data collection program. But any effort to streamline the off-cycle credit approval process must be contingent upon gathering this data.

Mr. BURGESS. The Chair thanks the gentleman for his testimony. Dr. Cooper, you are recognized for 5 minutes.

STATEMENT OF MARK COOPER

Dr. COOPER. Thank you, Mr. Chairman and members of the committee. The Consumer Federation of America has participated in hundreds of efficiency rulemakings and regulatory negotiations and legislative hearings involving large and small energy devices from automobiles to heavy trucks to computers to light bulbs. We participate in every round of comments on the light-duty standards since the passage of the Energy Independence and Security Act.

Our technical expertise is not in the design and construction of products, but in the design and construction of minimum efficiency standards. We believe that learning how to build a good standard is as important to success as knowing how to build a good product. We do look at the technological assessments, economic analyses, and examine market behavior to make sure we understand what kind of program will be in the consumer's interest.

I will briefly discuss seven points that I outline in my testimony and will do so before the agency. Under the base case, consumers are the big winners with total benefits in our view over five times the cost. Three-fifths of those benefits are direct consumer pocket-book benefits because the total cost of driving goes down.

Second, low-income consumers benefit more than the average consumer because operating costs of vehicles are much more important in their total cost of driving than ownership cost. They buy used vehicles. And those used vehicles, it turns out, get a disproportionate share of the benefits of fuel savings because they are not fully captured in the resale price. They get the benefit of the second half of the life of the vehicle.

And third, let's be clear. Low-income people suffer the most from environmental and pollution harm that results when we drive dirty cars. They suffer the most. They benefit the most from the indirect effects.

Now the National Program is still strong in spite of dramatic reduction in the cost of gasoline for a simple reason, because the minimum efficiency standards were well designed, well written by Congress, a law signed by George Bush, I remind you, and implemented effectively by the Obama administration.

We call these command but not control regulations. I am going to patent that—command but not control. Because what these regulations do is they address many market imperfections, but they harness the power of capitalism and the market to deliver the benefits at the lowest possible cost. They give producers the freedom to meet the standard in the best way possible to meet their interests. And just look at the array of options. There are hundreds of options available and consumers get the vehicles they want.

Automakers have done a magnificent job in using their freedoms. They are overcomplying, the costs are coming down, innovation is raging, so the economics of the capitalist automakers are meeting these standards. Of course their political arms come to Capitol Hill and complain. But that is what they always do. They overestimate costs by a factor of three or four. It is not \$50 a month, it is closer to 15 and that makes a big difference.

If you look at the agencies, they have listened, identifying a dozen things that people said they should do and they have done it. They considered scenarios, dozens of scenarios to look at the impact, and they have concluded that this is a positive program that is working tremendously.

Finally, you hear a lot about differences between them. Let's be clear, they agree this is the right direction. They are having a healthy debate about cost, but their debate is at a half or a quarter of what the industry says, and history shows the industry always overestimates the cost.

Let me make a final point on the ZEV program which is not greatly implicated here. The chairman bubbled about the fact that he drives a strong hybrid. Hats off to you, sir. The single largest reason that you had that vehicle available was the California Low Emission Vehicle program. It was California that told the auto-makers you must find these vehicles. And they stood their ground and we now have hybrids because California came first. It is a perfect example of American federalism at its best.

So before you mess with the leadership role that the clean car States—and it is the Northeast and the West. There were 30 in the LEV program, there are eight in the ZEV program. They are the fifth-largest auto market in the world. Before you squash that leadership and that creativity, think hard about the benefits of having a leader and others to follow. Thank you.

[The prepared statement of Dr. Cooper follows:]



Consumer Federation of America

**Testimony of
Dr. Mark Cooper
Director of Research
Consumer Federation of America**

on

**Midterm Review and an Update on the Corporate Average Fuel Economy
Program and Greenhouse Gas Emissions Standards for Motor Vehicles**

Before the

**Committee on Energy and Commerce
Subcommittee on Commerce, Manufacturing, and Trade
Subcommittee on Energy and Power
U.S. House of Representatives
September 22, 2016**

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE

The Consumer Federation of America¹ has participated in dozens, if not hundreds, of efficiency rulemakings, regulatory negotiations, and legislative hearings involving large and small energy using consumer durables, ranging from automobiles to heavy duty trucks, air conditioners, furnaces, water heaters, computers, and lightbulbs.² We have participated in every round of rulemaking for fuel economy standards since the passage of the Energy Independence and Security Act, which rebooted and reformed the CAFÉ program.

We appreciate the opportunity to share our views of the current state and future prospects for the National Program. We will submit our full agency comments for the hearing record and look forward to working with the committees to develop the most effective, consumer-friendly fuel economy and transportation sector greenhouse gas reduction program possible.

Our technical expertise is not in the design and construction of these consumer durables, it is in the design and implementation of minimum energy standards.³ We believe that knowing how to build an effective standard is at least as important to arriving at a successful outcome as knowing how to build a consumer durable. Although we do not claim expertise in the technical design of consumer durables, we do review the technical economic studies, prepared by others, and evidence on the market performance of to determine whether there are significant potential consumer savings that would result from a higher standard.

¹ The Consumer Federation of America is an association of more than 250 nonprofit consumer groups that was established in 1968 to advance the consumer interest through research, advocacy, and education.

² The CFA website (<http://www.consumerfed.org/issues/energy>) lists over 100 pieces of legislative testimony and regulatory comments in home energy and motor vehicles, most of which involve energy use and efficiency standards. The NCLC website (<http://www.nclc.org/issues/appliance-efficiency-standards.html>) lists a dozen comments, letters and lawsuits involving appliance efficiency standards.

³ Mark Cooper, "Energy Efficiency Performance Standards: Driving Consumer and Energy Savings in California," presentation to the *California Energy Academy*, February 20, 2014); *Energy Efficiency Performance Standards: The Cornerstone of Consumer-Friendly Energy Policy*, October 2013.

SUMMARY OF TESTIMONY

In my testimony today I will briefly discuss seven points that will be examined in detail in our comments to be filed in response to the release of the Technical Assessment Review.

1) Consumers are the big winners, with total benefits well over five times the costs. Three-fifths of those benefits are enjoyed as direct pocketbook cost savings resulting from a reduction in the total cost of driving.

2) Low income consumers benefit more than the average consumer because operating expenses are much more important in their total cost of driving.

3) The benefits of the National Program are stills so strong, in spite of declining gasoline prices, because the minimum performance standards were extremely well designed. They are what I call a “command but not control” approach to regulation. They address numerous market imperfections and do so in a manner that harnesses the power of capitalism and markets to meet the standard in the least cost manner possible. This is not your grandfather’s CAFÉ program; it ensures consumers have choices in what to buy and automakers have freedom to select the technologies they know best to meet the standards.

4) Automakers have done an excellent job with the freedom they have. They are over-complying and costs are coming down. Innovation is roaring.

5) Our analysis shows that the industry complaints about the standards are the typical handwringing, which has proven to be wrong time and again in the past. The current round of complaints overestimates the costs by a factor of five, misrepresents what consumers want and ignores how much the billions of dollars they spend on advertising influences consumer behavior. The direct attack of the Alliance’s on the National Program is based on a mixture of

self-serving, unsubstantiated assumptions, false choices and misrepresentation of what consumers want.

6) The indirect attack on the National Program, through a think tank funded by the automakers is equally unconvincing. Six months ago their report identified a dozen things the Technical Assessment Review should do. Having read through all 1200 pages, it is clear that the agencies have done all these things and still find a strongly positive outcome.

7) The automakers are also overstating the differences between the agencies and demanding a unified National Program in the hope that this would lower the standards. At this stage, the problem is overstated and the two agencies that support the current standard (or stronger) have a much stronger case

EXPLANATION OF WHY THE NATIONAL PLAN HAS BEEN SO SUCCESSFUL

1. CONSUMER BENEFITS OF THE STANDARD

The topline results of the launch and early implementation of the National Program are quite simply, a very positive bottom line.

Consumer Pocketbook Benefits

- In spite of a significant decline in the current and projected price of gasoline, the benefits of the program far exceed the costs.
- The consumer pocket benefits continue to exceed the consumer pocketbook costs by a substantial amount, with a benefit cost ratio of approximately over 3 to one.
- The payback period is about five years, or less than half the life of the vehicle.
- Consumer pocketbook benefits still constitute the bulk of the total national benefits (about two-thirds).
- One way to summarize this outcome, recognized by NHTSA is to calculate the cost per gallon saved. EPA estimates that over 50 billion gallons of oil will be saved at a cost of \$36 billion. That works out to just over \$0.70 per gallon, a bargain no consumer in his or her right mind would pass up.

Additional National Benefits

- Environmental and public health benefits are slightly larger than the cost of the technology.
- The macroeconomic benefits of increasing consumer purchasing power should also be included, although EPA and NHTSA have chosen not to. In 2012, EPA ran an econometric model which showed that the macroeconomic multiplier effect almost doubled the economic benefit. Our comments in the heavy duty truck rule show that this order of magnitude is correct. Thus, the macroeconomic benefits are twice the cost.

Total National Benefits

- Combining all benefits, the total benefit is close to six times the cost.
- To put this in other word, The National Program could more than pays for itself in consumer pocketbook saving alone, or environmental public health savings, or macroeconomic stimulus. Taken together the National Program delivers a huge benefit in terms of consumer and total social surplus.

2. LOW INCOME HOUSEHOLDS

Four years ago we explained why low income households are big winners from fuel economy standards and the EPA has looked at our arguments in the Technically Assessment Review. They found them to be spot on.⁴

First, low income households make up a much smaller part of the new vehicle market than their share in the overall population, about one-tenth. Therefore, the operating cost of vehicles makes up a much larger part of their total cost of driving than the average household and fuel economy standards reduce operating costs.

Second, because low income households buy used cares, they tend to benefit from the fact that the economic value of future fuel savings is only partially reflected in the resale price of used vehicles. Low income households get a disproportionate share of the operating cost reduction.

⁴ TAR, pp. 6-16 to 6-22.

Third, low income households are likely to be disproportionate beneficiaries of the indirect benefits. Low income households are to suffer most from environmental and public health externalities associated with the operation of vehicles. They are likely to suffer most in a weak economy and benefits from policies that strengthen it. Therefore, they are likely to benefit most from reductions in those impacts.

Fourth, while one can debate whether the standards will increase vehicle sales and accelerate scrappage, by 2022, which is the focal point of the mid-term evaluation, the vast majority of cars available on the used car market will have been built under the fuel economy standards rebooted by the Energy Independence and Security Act of 2007. Low income households will be buying more fuel efficient vehicles as a result of the standards program.

3. WELL-CRAFTED STANDARDS

We approach the setting of standards from a uniquely consumer point of view, always starting from three basic questions:⁵

- Will a standard save consumers money?
- Why is there an efficiency gap that appears to impose unnecessary costs on consumers?
- Why is a standard an appropriate policy?

When we conclude that a standard is appropriate, we turn our attention to the design

- How can the standard be best designed to achieve the goal of lowering consumer cost?

In a number of regulatory proceedings and academic articles we have argued and demonstrated that performance standards are among the most effective and powerful tools of energy policy. We have applied this framework to evaluate a range of energy consuming

⁵ Adapted from Mark Cooper, "Energy Efficiency Performance Standards: Driving Consumer and Energy Savings in California, February 20, 2014); *Energy Efficiency Performance Standards: The Cornerstone of Consumer-Friendly Energy Policy*, October 2013).

durables, including, in addition to light duty vehicles, gas furnaces, computers and heavy duty trucks. The extensive and intensive analysis of the current standards demonstrates that in the National Program EPA/NHTSA/CARB have designed an extremely effective performance standard, as the following table shows.

IMPERFECTIONS POTENTIALLY ADDRESSED BY STANDARDS⁶

<u>Societal Failures⁷</u>	<u>Structural Problems⁸</u>	<u>Endemic Flaws</u>	<u>Transaction Costs</u>	<u>Behavioral⁹</u>
Externalities ¹⁰	Scale ¹¹	Agency ¹²	Sunk Costs, Risk ¹³	Motivation ¹⁴
Information ¹⁵	Bundling ¹⁶	Asymmetric Information	Risk & Uncertainty ¹⁷	Perception ¹⁸
	Cost Structure ¹⁹	Moral Hazard	Imperfect Information ²⁰	Calculation ²¹
	Product Cycle			Execution ²²
	Availability ²³			
	<i>Produce differentiation²⁴</i>			
	<i>Incrementalism²⁵</i>			

Source: Framework developed in Comments of the Consumer Federation of America, Proposed Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, Environmental Protection Agency 40 CFR Parts 86 and 600, Department of Transportation 49 CFR Parts 531, 633, 537, et al., November 28, 2009. Italicized references are additional factors added by the Technical Assessment Review. Page references are to the TAR

⁶ The efficiency gap persists, P. 6-5, despite these developments and uptake of energy efficiency technologies, lags behind adoption that might be expected under these circumstances.” Quoting the National Academy of Sciences, P. 6-7, [T]here is a good deal of evidence that the market appears to undervalue fuel economy relative to its expected present value.”

⁷ P. 6-7, the nature of technological invention and innovation.

⁸ P. 6-7, Consumers cannot buy technologies that are not produced; some of the gap in energy efficiency may be explained from the producers’ side.

⁹ P. 6-5, behaviors on the part of consumers and/or firms that appear not be in their own best interest (behavioral anomalies).

¹⁰ P. 6-8, dynamic increasing returns. network effects; p.4-35, the potential existence of ancillary benefits of GHG-reducing technologies... These can arise due to major innovation enabling new features and systems that can provide greater comfort, utility, or safety.

¹¹ P. 6-8, the structure of the automobile industry may inefficiently allocate car attributes.

¹² P. 6-7, product differentiation carves out corners of the market for different automobile brands.

¹³ P. 6-6, Consumers may be accounting for uncertainty in future fuel savings

¹⁴ P. 6-6, Consumers may... not optimize (instead satisficing).

¹⁵ P. 6-5 lack of perfect information.

¹⁶ P. 6-6 Fuel-saving technologies may impose hidden costs.

¹⁷ P. 6-6, Consumers might be especially averse to short-term losses....relative to long term gains.

¹⁸ P. 6-5, Consumers might be “myopic” and hence undervalue future fuel savings; p. 6.6 Consumers may focus on visible attributes... and pay less attention to attributes such as fuel economy that typically do not visibly convey status.

¹⁹ P. 6-8, First mover disadvantages, p. 4-33, Thus, instead of the first-mover disadvantage, there is a regulation-driven disincentive to “wait and see.”

²⁰ P. 6-6, consumers might lack the information necessary,

²¹ P. 6-6, consumers might... not have a full understanding of this information.

²² P. 6-6, selecting a vehicle is a complex undertaking... consumers may use simplified decision rules.

²³ P. 6-7, the role of business strategies.

²⁴ P. 6-7, separating product into different market segment... may reduce competition.

²⁵ P. 6-8, Automakers are likely to invest in small improvements upon existing technologies.

First, and foremost, as the following table shows, they have identified a number of potential market imperfections that the standards address. These follow the imperfections that we identified as important in our earlier analysis. One can argue about which imperfections are most important or most prominent, but there is no doubt that there are many that affect the energy efficiency market

Second, and of equal importance, “command but not control” performance standards work best when they embody six principles,²⁶ which are clearly at the core of the National Program.

- **Long-Term:** Setting an increasingly rigorous standard over a number of years that covers several redesign periods fosters and supports a long-term perspective. The long term view lowers the risk and allows producers to retool their plants and provides time to re-educate the consumer.
- **Product Neutral:** Attribute based standards accommodate consumer preferences and allow producers flexibility in meeting the overall standard.
- **Technology-neutral:** Taking a technology neutral approach to the long term standard unleashes competition around the standard that ensures that consumers get a wide range of choices at that lowest cost possible, given the level of the standard.
- **Responsive to industry needs:** The standards must recognize the need to keep the target levels in touch with reality. The goals should be progressive and moderately aggressive, set at a level that is clearly beneficial and achievable.
- **Responsive to consumer needs:** The approach to standards should be consumer-friendly and facilitate compliance. The attribute-based approach ensures that the standards do not require radical changes in the available products or the product features that will be available to consumers.
- **Procompetitive:** All of the above characteristics make the standards pro-competitive. Producers have strong incentives to compete around the standard to achieve them in the least cost manner, while targeting the market segments they prefer to serve.

²⁶ Mark Cooper, “Energy Efficiency Performance Standards: Driving Consumer and Energy Savings in California, February 20, 2014), slide 22.

4. THE INDUSTRY RESPONSE TO WELL-CRAFTED PERFORMANCE STANDARDS

These continuing positive results and the fact that automakers are not only complying with the early standards, but over complying, is driven by the careful design of the standards and the rational response of the automakers.

- As we noted and advocated, the original standards were responsible, and did not seek to push fuel economy/pollution reduction to the limit of technology. The original goals were “inframarginal” with respect to the capabilities of the industry.
- The standards remain inframarginal, with many combinations of technologies available to comply.
- While the biggest potential game changer in terms of compliance – electric vehicles – are not necessary to meet the standards, the evidence continues to grow that they could play a much larger part in the vehicle fleet.

As our historical analysis showed, the industry has responded as market theory and past experience predicts, a process that is observable at both the macro and micro levels.

- The industry has found lower cost ways of complying with the standards than originally thought.
- The mix of technologies likely to be chosen has shifted due to different speed of development in knowledge and cost.
- One of the most popular approaches to meeting the standards, the Atkinson-2 engine was not even considered in the initial analysis and would never have been applied widely, but for the standards.
- There is no evidence that the costs of compliance are disrupting the auto market in any way and consumers are having no difficulty in finding the vehicles that they prefer at prices that are affordable.

5) MISLEADING ANALYSIS FOR THE AUTOMAKERS

The AAM analysis makes a remarkable series of erroneous assumptions and misleading comparisons and claims.

The analysis looks at only the costs of the standards and not the benefits

The first slide (p. 2) claims that “only OEMs have real skin in the game.” In fact, since the consumer pocketbook benefits exceed the technology costs by more than three-to-one, consumers have twice as much “skin in the game.” As noted above, environmental, public health and macroeconomic benefits should also be included. In other words, consumers and society have as much as six times as much “skin in the game” as the automakers. The claims ignore the fact that the agency analyses show that the total cost of driving declines (p. 35)

The Alliance makes a series of erroneous and misleading comparisons:

The Automakers present numerous nonsensical comparisons. For example, on the list of public concerns (p. 7), they note that terrorism, race relations and a weak economy are a greater concern to the public. Improving fuel economy does not detract from policies to address these bigger problems. Indeed, it can be argued that reducing oil consumption and imports helps to undermine the leverage of terrorists, while the resulting macroeconomic growth improves the economy.

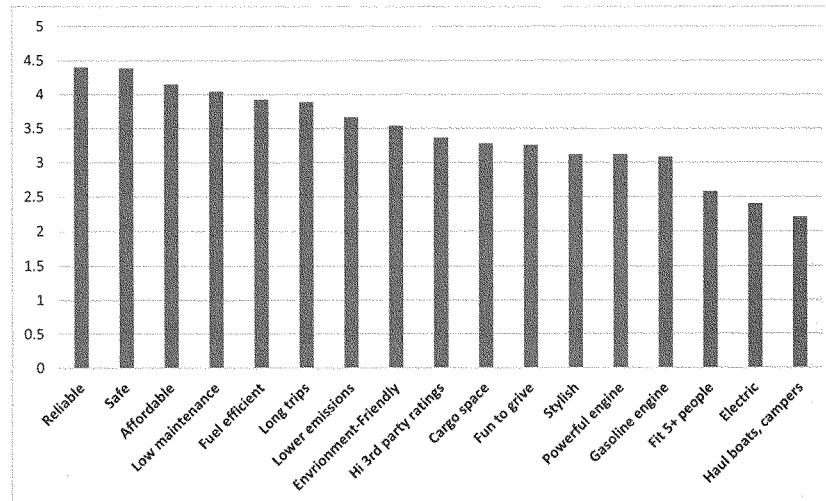
Even when they present a bogus choice (p. 7) that assumes the global threat of climate change “requires government regulations... that raised the price on new cars... pricing new cars out of the reach of many American families,” more respondents opt for more regulation (42% to 41%). Similarly (p. 8), they point out that 69% of respondents want to encourage mobility, vs. 16% that want to discourage mobility. Since the standards lower the cost of driving (and have a rebound effect to increase driving), they obviously encourage mobility.

The public is not as enamored of gasoline powered muscle cars and truck as the automakers claim

If an EV and gasoline vehicle were matched on cost and travel length (p. 9), more (48% to 43%) would prefer the electric vehicles and a clear majority (57%) are willing to pay more for an electric vehicle.

As the following table shows, the analysis of desirable vehicle attributes shows that Consumers want reliable, safe, affordable and low maintenance vehicles (p. 10). There is no reason to believe that fuel efficient gasoline engines or electric vehicles (EVs) cannot fill the bill and the automakers are working feverishly to ensure that they do so.

ALLIANCE OF AUTOMOBILE MANUFACTURERS, VEHICLE ATTRIBUTE SURVEY, AUGUST 2016



Source and Notes: Mitch Bainwol, President and CEO, Alliance of Automobile Manufacturers, *Consumers & Fuel Economy*, CAR Management Briefing Seminars, Traverse City, Michigan, August 2016, The winter related question, specific to the North East, has been discarded. It would rank 12th of 18, low in California, high in New England)

Moreover, after the big four attributes, respondents care as much about fuel efficiency as the ability to take long trips and the automakers are working on that too. Beyond these big six attributes, the valuation of others falls off, but even here the message for EVs is positive. Environmental impacts rank a lot higher (8th and 9th) than powerful engines (13th) or engine type (gasoline power =14th, electricity = 16th). Fitting more than 5 people (15th) or hauling boats and campers (ranks dead last) don't matter much. If you watch the TV ads and go into the show

rooms, you would have to conclude that the automakers are pushing the wrong vehicles. More importantly, there is nothing in this data that suggests EVs cannot be a big success. Our survey results, this data and automaker investments can be interpreted to mean that EVs are on the early part of the adoption curve and there is a very strong basis to expect success.

6. INDIRECT ATTACKS BY THE AUTOMAKERS ALSO MISS THE MARK BY A WIDE MARGIN

While a report from the School of Public and Environmental Affairs of Indiana University, which is supported by the automakers, raises many issues and questions about the Fuel Economy standards. As the following Table shows, the report should carry no weight with policymakers on procedural and substantive grounds.

RECOMMENDATION FROM *RETHINKING AUTO FUEL ECONOMY* COMPARED TO THE EPA/NHTSA DRAFT *TECHNICAL ASSESSMENT REPORT*

<u>Issue/Recommended for Analysis of the National Program</u>	<u>EPA/NHTSA Action</u>	<u>Impact on Evaluation</u>
<u>Technical</u>		
1. Gas price changes	Use EIA estimates	+
2. Expert Technology Analysis	Integrate NRC/Teardown analysis	+
3. Rebound	Extensive literature Review	+
<u>Consumers</u>		
4. Perceptions	Extensive literature Review	+
5. Capabilities	"Efficiency Gap" analysis	+
6. Sensitivities	Extensive literature Review	+
<u>Economic Impacts</u>		
7. New Vehicle Effects	Extending 2012, little Impact	+
8. Non-vehicle macroeconomic Effects likely to be positive	Mentioned, but not analyzed,	(+)
<u>ZEV</u>		
9. Consider Impact on Market	Small fleet acknowledged	+
10. Modify Standards if Needed	Out of Bounds, EPA/NHTSA lack authority	=
11. Consider Complementary Policies	Discussed	+
12. <u>Risk Assessment</u>	Sensitivity analysis, wide range of plausible scenarios considered	+

Source: Issues/Recommendations from Sanya Carley, et al., *Rethinking Auto Fuel Economy Policy: Technical and Policy Suggestions for the 2016-17 Midterm Reviews*, February, 2016.

There are a dozen specific recommendations embodied in the report. We believe one is out of bounds, in the sense that EPA/NHTSA lack the authority to implement changes in the California ZEV program, although they certainly could discuss changes with the California Air Resources Board. However, we do not think the ZEV program is malfunctioning or in need of repair. Of the remaining eleven recommendations, EPA/NHTSA have addressed 10 and their extensive analysis shows that the National Program is functioning quite well. Prior analysis in the 2012 Technical Support Document suggests that the one recommendation that has not yet been addressed will also support the National Program.

We doubt that the answers given by the agencies will end the debate, so it is important to note that the thrust of much of the analysis and recommendations in the framing of the questions is fundamentally flawed. There is no evidence that the impacts on consumers that they fret about have occurred under the National Program or are on the horizon. The absence of these effects flow from two fundamentally incorrect approaches that the authors take and real world facts they ignore.

Above all, the beneficial effect of a reduction in the total cost of driving is hidden behind cost estimates that are 2 to 10 times higher than the agency estimates and benefits that are underestimated by 50 percent.

7. ONE NATIONAL PROGRAM

The Automakers claim “there is no One National Plan” (ONP, p. 31-33). Although all the three agencies involved in the National Program generally agree that the standards are positive and point generally in the same direction. In fact, two of the three agencies (EPA and CARB) agree quite closely. NHTSA has headed in a tangential direction based on unfounded

and incorrect assumptions. Its analyses are properly treated by EPA as a “sensitivity” case.

NHTSA has some heavy lifting to do if its approach is to be accepted as the primary approach.

In our view NHTSA has gone off on a tangent from the other two agencies because of erroneous assumptions in its analysis. It increased the estimate of costs by unjustifiably raising the mark-up on fuel efficiency technologies and including fines paid in the cost. If lower cost technologies are available from compliant manufacturers, they will set the market clearing price and neither excessive profits nor fines will be recoverable in the market.

It decreased the estimate of benefits by assuming a dramatic reduction of vehicle miles traveled, which it admits could well be a result of the great recession.

It continues to impose the assumption that technologies included in vehicles must have a three year payback. That assumption was never justified, since consumers are willing to accept a five year payback and, when all manufacturers face a similar constraint, there should be no disadvantage in meeting a higher constraint. Not only was the assumption never justified, but the changes in the market since 2012 have moved the market farther from the artificial constraint. Consumers are holding their vehicle longer and the majority of new car buyers are taking loans of five years or more. A five year payback would be more appropriate, if such a constraint is needed, although NHTSA would be better off allowing technologies to enter the model in the order of least cost.

Mr. BURGESS. The Chair thanks the gentleman for his testimony. Mr. Bozzella, you are recognized for 5 minutes, please.

STATEMENT OF JOHN BOZZELLA

Mr. BOZZELLA. Thank you, Chairman Burgess, Ranking Member Schakowsky. Thanks for the opportunity to testify today. I am here on behalf of the Association of Global Automakers. I want to thank you for holding this hearing today and for the opportunity to be here as a representative of international automakers that design, build, and sell cars and light trucks in the United States.

In 2009 and again in 2012, the auto industry, Federal Government, and the State of California committed to a unified program for fuel economy and greenhouse gas emissions. These goals are very important and we support them. But since this program set standards for vehicles more than a decade into the future, regulators are now beginning a midterm evaluation to assess the assumptions made in 2012 and to reexamine the path toward 2025.

To get to the point, the question on everyone's minds at this hearing is this. Are the standards for 2022 to 2025 that were set almost 5 years ago too high, too low, or just right? The reality, the really only truthful, albeit unsatisfying, answer to that question is it depends. It depends on a number of factors. It depends on what customers want, and by want I am not talking about what is expressed in public opinion surveys. I am talking about what customers want as expressed by their actual purchases by the votes they cast with their wallets.

Do they want electric vehicles, minivans, sedans, pickups, and how much are they willing or able to pay for what they want? It depends on price of fuel, because the price of gasoline has a direct impact on customer behavior. Gas has been cheap for the last few years and customers have reacted by buying trucks and SUVs which now account for more than half of U.S. vehicle sales. They have reacted by not buying hybrids or electric vehicles, sales of which compared to conventional vehicles have dropped despite the fact that customers have more and better hybrid and electric vehicles to choose from than ever before.

And it depends on a regulatory program that recognizes this reality that we have to find a way to reconcile what the customer wants with our public policy goals. That is because when we are talking about a number, whether it is 54.5, 50.8, the fuel economy numbers that we achieve aren't solely determined by manufacturers or regulators or legislators. They are ultimately determined by the customer.

In my written testimony I have described in greater detail our initial analysis of the Technical Assessment Report, and I don't want to use this time to go over that ground. Instead, I would like to emphasize a few points. First, if every American went out today and purchased a hybrid or electric vehicle and nothing but hybrids and electric vehicles, meeting or beating a target of 54.5 miles per gallon would be no big deal. But it is not that simple.

Second, achieving our fuel economy and greenhouse gas emissions targets is not just about engineering and ingenuity, it is also about economics and politics. There are more highly efficient vehicles on the market today than ever, but we have two or three, actu-

ally, different regulatory schemes that manufacturers have to comply with. That creates inefficiencies and inconsistencies that needlessly waste resources and drive us to high cost and high price solutions.

And third, we ought to be doing everything we can to encourage support and reward innovation. As we look to 2025 and beyond, we need to expand our options and choices. We are lagging woefully in building the infrastructure to support electric vehicles. Efforts to deploy connected vehicles that will be able to reduce congestion and save thousands of lives annually are being delayed by a fight over the spectrum dedicated to safety.

We need to examine new models of mobility that could help us achieve our policy goals. Our concern at Global Automakers is that if we get locked into a discussion about what the numbers should be, a discussion that is, to be kind, a bit stale, we may miss opportunities that provide more effective and faster paths to our goals.

For our part, we are ready and eager to have these discussions. We need to work together to get this right. Thank you again for the opportunity to testify. I welcome your questions.

[The prepared statement of Mr. Bozzella follows:]



Aston Martin • Ferrari • Honda • Hyundai • Isuzu • Kia
Maserati • McLaren • Nissan • Subaru • Suzuki • Toyota

Testimony of John Bozzella

**President and CEO, Association of Global Automakers, Inc. before the
House Committee on Energy and Commerce
Subcommittee on Commerce, Manufacturing and Trade and
Subcommittee on Energy and Power Hearing on the Midterm Review and Update on the
Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for
Motor Vehicles**

September 22, 2016

Summary

- Global Automakers' members are manufacturing cars and trucks that are more fuel efficient and cleaner than ever before, and improvements continue. Automakers have introduced numerous improvements in conventional vehicles, as well as remarkable advancements in alternatives to traditional gasoline vehicles, such as plug-in hybrid electric, battery electric, and hydrogen fuel cell electric vehicles.
- In 2012, the Environmental Protection Agency (EPA), the National Highway Traffic Safety Administration (NHTSA) and the California Air Resources Board (CARB) established standards for light duty fuel economy and greenhouse gas (GHG) emissions through 2025, under "One National Program" (ONP). The ONP includes a "Midterm Evaluation" to assess the assumptions made in 2012 and reexamine the path towards 2025.
- The Midterm Evaluation is critical to the overall goals of a strong, unified national program. Federal and state fuel economy and GHG emissions standards must be aligned to minimize differences and costs while maximizing environmental and energy benefits.
- The first step in the Midterm Evaluation process was the agencies' release of the draft Technical Assessment Report (TAR) in July. According to the TAR, additional technologies beyond what is on the road today will be needed to meet the standards through 2025. Our initial analysis of the TAR shows that the agencies overestimated the efficiencies of many technologies and that as a result, more technologies will be needed than those included in the TAR. This will increase prices beyond earlier estimates and may result in customers having to make trade-offs between fuel efficiency and other options.
- As the EPA, NHTSA, and CARB continue through the Midterm Evaluation process and into the future, there are three crucially important issues that should be at the forefront: (1) ensuring that our customers' needs and preferences are accounted for; (2) reducing inefficiencies and inconsistencies in the system that create drag, discourage innovation, and waste resources; and (3) identifying how we can work together to achieve the nation's climate and energy goals, both through 2025 and beyond.

Testimony

Chairman Burgess, Chairman Olson, Ranking Member Schakowsky, and Ranking Member Rush, on behalf of the Association of Global Automakers (Global Automakers), I want to thank you for the opportunity to testify before your Subcommittees today. Global Automakers represents international automobile manufacturers that design, build, and sell cars and light trucks in the United States. Our member companies have invested \$56 billion in U.S. based facilities, directly employ more than 100,000 Americans, and sell nearly half of all new vehicles purchased annually in the country. Combined, our members operate three hundred production, design, R&D, sales, finance, and other facilities across the United States.

Our members are manufacturing cars and trucks that are more fuel efficient and cleaner than ever, and advancements continue. Automakers have improved engine and transmission efficiency, reduced vehicle weight, improved aerodynamic designs, and applied more efficient cooling and lighting, stop-start systems to reduce idling-related emissions, and other technologies.

Automakers are also making remarkable progress in alternatives to traditional gasoline vehicles, such as plug-in hybrid electric and battery electric vehicles, which get energy from the grid, and fuel cell electric vehicles, which generate energy by converting hydrogen to electricity. Global Automakers' members' ongoing and longtime investments in the development and deployment of these vehicles is proof of their commitment to these technologies. Our members are in the market today with vehicles, such as the Toyota Mirai Fuel Cell, Hyundai Tucson Fuel Cell, Honda Clarity Fuel Cell, Nissan Leaf Battery Electric, and Kia Soul Battery Electric. We view

these technologies as important to our long-term goals of reducing petroleum consumption and lowering greenhouse gas (GHG) emissions.

Seven years ago, the auto industry, the federal government, and the state of California committed to “One National Program” (ONP) to establish harmonized Corporate Average Fuel Economy (CAFE) and GHG emissions standards for light duty vehicles to provide substantial environmental benefits across the nation. As part of this commitment, in 2012, the U.S. Environmental Protection Agency (EPA) and the National Highway Traffic Safety Administration (NHTSA) promulgated standards for model years (MY) 2017 through 2025. Recognizing the nationwide benefits produced by the federal program, California issued regulations accepting compliance with the federal standards as compliance with the California GHG program promulgated by the California Air Resource Board (CARB).

In light of the fact that the 2012 rule established standards over a decade into the future and that NHTSA is statutorily required to undergo another rulemaking, ONP includes a “Midterm Evaluation” to assess the assumptions made in 2012 and reexamine the path towards 2025. This Midterm Evaluation was key to the industry’s participation in ONP.

Today’s hearing comes at a pivotal point during the Midterm Evaluation process, and I thank the Subcommittees for holding this hearing. Congress must play an active oversight role during this regulatory review.

The Midterm Evaluation will entail an assessment of a broad range of issues, such as the agencies’ assumptions concerning the effectiveness and market penetration of various technologies. This Midterm Evaluation must also look at the broader issues of consumer

acceptance for new vehicles with these technologies. The result of this review will be a decision as to whether the standards for MY 2022-2025 should be adjusted.

The first step in the Midterm Evaluation was the agencies' release of the draft Technical Assessment Report (TAR) in July. The TAR analysis runs over 1,200 pages covering thousands of data points and reference models, and contains two separate analyses—one by NHTSA and one by EPA, with differing baseline years and using different analytic models.

We are currently working with our member companies and consultants to analyze all of this material so that we can provide meaningful input as quickly as possible, but we continue to be concerned with the lack of transparency in the TAR and the underlying technical analyses. We expect that the EPA's upcoming Proposed Determination and NHTSA's Notice of Proposed Rulemaking for the MY2022-2025 standards will consider all of the comments submitted on the draft TAR, and the result will be a Midterm Evaluation that is based on a complete record and the most reliable and up-to-date data.

As the EPA, NHTSA, and CARB continue through the Midterm Evaluation process and into the future, there are three crucially important issues that should be at the forefront: (1) ensuring that our customers' needs and preferences are accounted for; (2) reducing inefficiencies and inconsistencies in the system that create drag, waste resources, and discourage innovation; and (3) identifying how we can work together to achieve the nation's climate and energy goals, both through 2025 and beyond.

Role of Customers

Regulators must understand the critical role of hardworking Americans who buy cars and trucks to the success of emissions and fuel economy standards now and through 2025. Customers determine, by their purchasing decisions, what vehicles are driven on our roads and what real world fuel consumption and emissions will be. They have specific needs and wants when they are considering a vehicle purchase, and technology and the price of the vehicle can factor into that decision. The draft TAR includes only a very brief discussion of the role of consumers, yet consumers' behaviors and attitudes are key to the future success of the program.

News coverage of the draft TAR release focused on a number – a miles per gallon (mpg) figure (50.8 mpg). This figure represents a target for fleet average fuel economy in 2025 based on revised estimates about what the vehicle fleet mix will be in the future. The target reflects only what size and types of vehicles customers are expected to purchase. The target does not necessarily measure the technological capabilities of manufacturers in improving efficiency or in developing alternatives to the internal combustion engine. In an environment of historically low gas prices, to what degree will consumers value more costly technologies that save fuel? As automakers employ more innovative fuel-saving technologies, will consumers embrace those technologies? These questions must be addressed.

According to the TAR, additional technologies beyond what is on the road today will be needed to meet the standards through 2025. Our initial analysis of the TAR shows that the agencies overestimated the efficiencies of many technologies and that as a result, more technologies will be needed than those included in the TAR. This will increase prices beyond earlier estimates and

may result in customers having to make trade-offs between fuel efficient technologies and other options, including vehicle size.

The footprint-based standards were intended to adjust for shifts in consumer tastes. However, this is only a one-dimensional view based on vehicle size (large sedan vs. compact car) or vehicle class (car vs. truck). The standards do not account for changing preferences between similarly sized vehicles in the same fleet or powertrain options within the same vehicle model. When consumers are considering the purchase of a new car or truck, they are thinking about much more than size. They are thinking about safety, utility, and reliability. A truck buyer will have a choice between a V6 and a V8 engine in the same model. The buyer of a particular car can choose to power it with a V6 engine, a turbo-charged inline 4, or a hybrid. Ultimately, consumers select a vehicle that meets their needs at a price they can afford.

Cost to Consumers

Cost is a significant factor in these purchasing decisions. Today, the average price of a new vehicle is estimated at \$33,560, already a 2.6% increase from the previous year.¹ According to the draft TAR assumptions, the proposed standards by MY 2025 would increase the cost of a new vehicle, on average, by between \$894 and \$1,017 compared to a MY 2021 vehicle.² Our preliminary analysis shows that this number increases by \$356 (or an additional 35-40%) when accounting for electric-drive vehicles that are required by the Zero Emission Vehicle Mandate.

¹<http://www.usatoday.com/story/money/cars/2015/05/04/new-car-transaction-price-3-kbb-kelley-blue-book/26690191/>.

² Draft TAR at ES-8.

This has a significant impact on Americans' monthly budgets, and the overall cost of the average vehicle is now more than half of the 2015 median income of \$56,500.³

Further, these estimates assume the car buyer will choose to spend the extra money on the types of technologies needed to achieve the standards, *i.e.*, purchasing the hybrid sedan instead of the one with the V6. The draft TAR also assumes that the increased purchase cost to consumers will be offset by fuel savings over the course of ownership of a more fuel efficient vehicle.

In an environment of low gas prices, many consumers will not see sufficient savings to justify the increased up-front cost of the advanced technology vehicle. Consumer research shows that car buyers will purchase a more expensive, high fuel economy vehicle only where the payback period (the period over which the increased upfront cost of the vehicle is offset by the reduced cost of fuel purchases) is between two and three years⁴. This stands in stark contrast to the five to six-and-a-half-year payback period assumed in the draft TAR.⁵ Further consideration must be given to the upfront costs consumers can manage and the time period over which that upfront cost would be recouped.

Additional Consumer Acceptance Factors

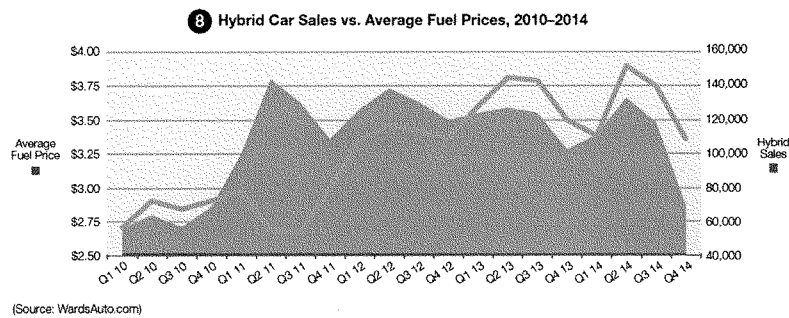
In addition to the question of what consumers can afford, there is also a question about what consumers will accept in terms of vehicle technologies, especially as the technologies affect how consumers drive, the feel of driving, or behaviors related to driving (*i.e.* the need to charge your

³http://www.nytimes.com/2016/09/14/business/economy/us-census-household-income-poverty-wealth-2015.html?_r=0.

⁴ National Academies of Science. "Consumer Impacts and Acceptance Issues." *Cost, Effectiveness and Deployment of Fuel Economy Technologies for Light-Duty Vehicles*, 317.

⁵ Greene, D. et al. "The Case for Market Failure." *Reducing Climate Impacts in the Transportation Sector*, 195-6.

vehicle instead of going to the gas station). The sale of gasoline-hybrid vehicles, which have been in the market for more than twenty years, serves as a strong proxy for consumer acceptance of advanced technology vehicles, and the impact of gas prices on those sales. What the research shows is a declining demand for hybrids as gasoline prices have fallen.



The data and the consumer research show that the overall cost of advanced powertrain vehicles, as well as the price of gasoline, play a significant role in the willingness of consumers to pay the increased price for these vehicles.

In addition to cost, the regulators must assess how consumers will react as fuel saving technologies have a more direct and noticeable impact on the driving experience. Technology will matter more to consumers in terms of the perceived trade-offs. Even today, car buyers do not necessarily think about the option of choosing a turbocharger on their vehicle, but they do react to its potential impact on performance. How will they think about start/stop technology – is it a benefit or a daily irritant? Or, will buyers of battery-electric vehicles be overly concerned with

finding the charging station closest to their workplace? As automakers develop new innovations to save fuel and reduce emissions, these technologies will become more visible to consumers and will likely become more of a “choice” in the purchase decision process. We need to carefully consider these questions going forward to make sure that, even if the technology can get us to 2025, consumers are along for the ride as well.

The Need to Maintain a National Program and Further Harmonize the Standards

Regulatory misalignment creates drag in the system. It prevents automakers from finding the most efficient and cost-effective path for improving fuel economy while also responding to consumers’ needs. Thus, a key goal of the Obama Administration’s 2017-2025 MY standards was to create “a unified approach that harmonizes NHTSA’s CAFE standards for fuel economy, the Environmental Protection Agency’s automotive greenhouse gas standards under the Clean Air Act, and California’s greenhouse gas program.”⁶ This approach was intended to address the concern that different standards at the federal and state levels would diminish the overall benefits of establishing *any* standards. The extent to which the standards are harmonized is one of the most important questions to be answered in this Midterm Evaluation. Unfortunately, today’s programs administered by EPA, NHTSA and CARB remain different in many significant ways.

Harmonization between Federal GHG and CAFE Programs

One of the fundamental goals of ONP was unification and alignment of two federal programs flowing from different statutes: the Clean Air Act and the Energy Policy and Conservation Act (EPCA). A real challenge posed by the two federal programs is that they were developed to

⁶ https://www.whitehouse.gov/sites/default/files/fuel_economy_report.pdf.

achieve different goals – reducing petroleum consumption in one case and reducing GHG emissions in the other. As a result, the two programs do not equally recognize the societal benefits of the technological strides the automakers are making for the environment. Further, the tools built into the programs to balance vehicle product planning with the increasing stringency of the standards are different, in some cases due to differences in statutory authority. The current scheme creates friction and drag in the system that slows innovation and results in unnecessary additional compliance costs ultimately borne by consumers with no additional environmental or energy benefits.

Despite statutory differences, which we would encourage Congress and the agencies to work to resolve, there is more that can be done to align the two federal programs. Areas where harmonization could provide the greatest benefit include:

Different standards and credit programs. Contrary to the promise of harmonization, which encouraged the manufacturers to support the program, the currently proposed standards result in a scenario in which a manufacturer could comply with one standard but violate the other. A harmonized program would not allow for such anomalies. Differences in the GHG and CAFE credit programs add unnecessary costs and complexity.

The agencies' Midterm Evaluation methodologies: The agencies use different models to assess the national program standards and answer questions such as the efficacy of fuel economy technology and its costs. The agencies have used two different baseline fleets (MY2014 and MY2015) to develop modeling for the draft TAR, and this divergence in modeling results in further challenges to program alignment. If agencies could agree to start in the same place, their modeling would yield clearer and more transparent results. Global

Automakers urges the agencies to develop a single, robust model that uses the same assumptions and other inputs based on the most up-to-date information available about the fleet and the technologies used for fuel economy and GHG reductions to create the starting point for any modeling.

Prior to the release of the draft TAR, Global Automakers and the Alliance of Automobile Manufacturers submitted a petition to NHTSA and EPA outlining some of the misalignments between the agencies' programs. We request that the agencies act expeditiously on this petition.⁷

Harmonization between the Federal Program and California

California, eleven additional states and the District of Columbia have adopted the California GHG program, which is part of ONP through a "deemed to comply" provision. This provision was critical to the auto industry's participation and commitment to support the ONP, since without it manufacturers would be faced with a patchwork of individual federal and state standards and compliance fleets. These provisions remain critical to the success of the program going forward, and we urge California to continue its commitment to the ONP. There is, however, room for greater harmonization between California and the federal agencies. Areas for further alignment include:

CARB regulatory timeline: While CARB is participating in the national Midterm Evaluation, it is also undergoing a midterm review of its own GHG program that is further along than the federal review and will likely make critical decisions well ahead of the federal process. It is

⁷http://www.globalautomakers.org/system/files/document/attachments/joint_alliance_-_global_petition_for_rulemaking.pdf

difficult to understand how standards can be aligned when the agencies are on such different schedules. These differences also mean that the same information available to the federal agencies will not be available to CARB, leading to the potential for very different conclusions. Global Automakers urges the federal agencies and CARB to align their regulatory schedules.

The Zero Emission Vehicle Mandate: In addition to its GHG emissions regulations, California has adopted a zero emissions vehicle (ZEV) mandate that specifies requirements for the sale of specific technologies—which include battery-electric, plug-in hybrid-electric, and fuel cell-electric vehicles—in the state through 2025. This mandate has been adopted by nine other states, primarily in the Northeast.⁸ Above and beyond these regulatory steps, California and seven of the other ZEV states signed the ZEV “Memorandum of Understanding,” under which the states have committed to building a ZEV market of 3.3 million cumulative ZEV sales by 2025. The ZEV mandate is regulated and enforced separately from the ONP, but greatly impacts the ONP.

CARB estimates that the incremental additional annual compliance cost of the ZEV regulations in California alone is approximately \$2 billion, with total costs through 2025 reaching \$10.5 billion and an estimated per vehicle cost to consumers of up to \$14,500.⁹ This scales up to \$24 billion dollars, as a conservative estimate, when all ten ZEV states are considered. This incremental cost for the ZEV program and technology is on top of the requirements set by the

⁸ The states that have adopted the California ZEV mandate are Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island and Vermont. For more information, please visit <http://www.drivingzev.com/>.

⁹ California Environmental Protection Agency Air Resource Board, Staff Report <http://www.arb.ca.gov/regact/2012/zev2012/zevisor.pdf>.

fuel economy and GHG emissions standards under One National Program. Whether or not a manufacturer needs ZEVs to comply with the fuel economy and GHG emissions standards does not matter; the ZEV mandate forces a certain technology pathway by requiring ZEVs to be sold in ten states. This mandated focus on ZEV sales forecloses the use of more efficient and more cost effective technologies to reduce GHG emissions. The ZEV mandate, in just ten states, increases the compliance cost of the national program and drives up vehicle prices for consumers in all fifty states.

In the current draft TAR, some of the assumptions made by the EPA have included the benefits of the ZEV mandate and counted the vehicles in the estimated compliance scenarios, but not the costs. Vehicles produced under the ZEV mandate should and must be counted and considered, but the costs of producing those vehicles must also be part of any thorough assessment. The agencies should take a consistent approach: just as the agencies account for both the benefits and costs of emissions reducing technologies for internal combustion engines, they should account for both the benefits and costs of the ZEV mandate. Moreover, in the current simulations, the agencies assume full compliance with the ZEV mandate in California and the nine other states. In other words, they assume that the projected 3.3 million ZEV vehicles and the necessary electric and hydrogen infrastructure to support them are fully in place and functioning at full capacity.

But the reality is that consumers are not embracing these technologies at the desired or projected rates, and states are not investing in the refueling infrastructure at the rate needed to support the vehicles, as many states have put other budget priorities ahead of support for ZEVs. Vehicle registration data indicates these vehicles, as a percentage of all new automobiles registered,

represented six tenths of one percent (0.6%) of the nation's market in 2015.¹⁰ The new vehicle market share of these vehicles was in 2014 at 0.7%, and in a year of record low gas prices and near record overall vehicle sales, battery electric, fuel cell electric, and plug-in hybrid electric vehicles did not increase in the market at the same rate as traditional cars and trucks.

While these advanced technology vehicles offer the possibility of zero-emission travel, they also present many challenges. Putting the technological considerations aside, more research is needed to better understand the consumer acceptance of ZEV technology. In order to increase deployment of these technologies, barriers such as cost, refueling infrastructure, consumer acceptance and other market externalities must be addressed. The marketplace for these vehicles is still in its early stages. Although additional technological advancements are expected for these vehicles—including improved range, reduced costs, and additional model offerings—consumer demand remains low, requiring additional time, resources, and investments by all stakeholders to support market development.

Importantly, the ZEV program produces no incremental GHG emissions benefits despite the high compliance costs. Current CAFE and GHG emissions standards already specify each manufacturer's total fleet-wide emissions, and therefore, in a system that averages together all vehicles in a manufacturer's fleet, the fleet-wide emissions standards act as a cap when combined with an overall compliance fleet strategy.

Given the cost, lack of incremental emissions benefits, and inflexibility of the mandate with regard to market-based factors, Global Automakers remains concerned about inconsistencies

¹⁰ IHS Global Vehicle Registration Data, January-December 2015.

between the ZEV mandate and the goal of a harmonized national CAFE and GHG program. EPA, NHTSA and CARB should evaluate and incorporate the costs of the ZEV program as a required technology pathway in the CAFE and GHG Midterm Evaluation.

Encouraging Innovation and Looking to a Future Beyond 2025

As the GHG and fuel economy standards become increasingly more stringent, it will be important for regulators to think beyond the combustion chamber and tailpipe, and to recognize that significant emissions reductions can be achieved through new and innovative technologies in broader realms and applications. Some of these technologies result in improving the fuel economy and GHG emissions of the specific vehicle to which it is applied. The “off cycle” program in ONP is intended to give manufacturers GHG and fuel economy credits for innovative technologies that result in real world fuel economy improvements that may otherwise not be accounted for by existing agency fuel economy and emissions laboratory testing programs. However, certain aspects of that program have become extremely burdensome and difficult for manufactures to use, which discourages such innovation. The agencies should be looking at how to enhance the off-cycle program to encourage innovation and ensure the benefits of additional, and real, GHG reductions.

The EPA and NHTSA should start thinking creatively about how new connected and automated vehicle technologies entering the marketplace will advance the goals of the GHG and fuel economy programs. With every year, automakers are innovating and developing vehicles that have the potential to revolutionize the overall driving experience while reducing energy consumption. Automated vehicles, with features available now like automatic emergency braking and lane departure warnings, help reduce crashes and associated traffic congestion.

Additionally, Dedicated Short Range Communications (DSRC) devices, utilizing the 5.9 GHz spectrum band, allow cars to communicate with each other and with the surrounding infrastructure leading to fewer crashes, less congestion, and other potential benefits. NHTSA agrees that this technology could be a "game changer," potentially addressing 80% of vehicle crashes involving non-impaired drivers. Connected car technologies that help reduce crashes and improve traffic management have the potential to make cars dramatically safer while reducing emissions - saving lives, saving fuel, and saving time spent on the road.

Global Automakers believes that the existing off-cycle credit program should account for demonstrable, real-world GHG emissions benefits from the application by automakers of these advanced technologies. We would welcome the opportunity to discuss with Congress and the agencies ways to make the off-cycle credit program more efficient so that it can do what it was intended to do—*i.e.*, incentivize investment in innovations that provide real-world improvements in fuel economy and GHG emissions that are not captured by EPA's existing fuel economy and emissions testing program—for individual vehicles and the fleet as a whole.

Now is the time to not only think broadly about ways to improve fuel economy and reduce GHG emissions under the current regulatory framework, but also look beyond 2025. Regulators and policymakers need to investigate the real-world benefits of connected vehicles, explore the possibilities that innovations in smart cities offer, and examine new models of car ownership and use that reflect the changing face of the consumer. These factors highlight the opportunities brought by the tremendous transformation occurring in mobility. These innovations are powerful in themselves, but together, they create significant opportunities for reducing GHG emissions and petroleum use.

We need to continue to work together to develop policies that consistently cover the entire country, and think broadly about fuel use and emissions. The question is not whether to reduce carbon produced by transportation, but how best to do it: how to create the right regulatory framework; promote innovation; and offer attractive solutions for consumers to choose vehicles that safely and efficiently get them to their destinations. We need to consider if the current regulatory framework is best suited to address the changing nature of the industry and mobility generally.

Conclusion

Global Automakers appreciates the Subcommittees' thorough attention to the Midterm Evaluation on GHG and fuel economy regulations. Congressional oversight of this review process is crucial given that these regulations will have a significant impact on our customers and your constituents for years to come.

The review of the assumptions that went into the MY 2022-2025 standards must be science-based and data-driven because the implications to customers are significant. We need to work together to eliminate inconsistencies in the national program in order to foster innovation and help reach our shared policy goals.

Thank you again for the opportunity to testify before the Subcommittee.

Mr. BURGESS. The Chair thanks the gentleman. And that concludes the testimony, so we will move on to the question and answer portion of the hearing. I recognize myself for 5 minutes for questions.

And Mr. Bainwol and Mr. Bozzella, perhaps I could start with you. We have heard a lot this morning on this panel and it has been a pretty informative, has been a very informative panel. But as you hear the testimony today and the testimony from our previous panel, what are some of the biggest errors in the assumptions that both the Environmental Protection Agency and National Highway Traffic Safety Administration make in doing their technical assessment, the draft Technical Assessment Review?

We will start with you, Mr. Bainwol, and then we will go back to Mr. Bozzella.

Mr. BAINWOL. Sure. I will be submitting our TAR response to the agency. I think it is due next Monday, and that will be a more full response. There are several concerns we have got. One is that there was not a sensitivity analysis done. That is one. Two is that in contrast to what Mr. German had to say, we believe that the technology yields are not going to be what EPA and NHTSA suggest they will be, and we think they will be at higher cost. This, at the end of the day is an intellectual debate and only time will prove the answer, but I will give you a few examples.

The TAR assumes that minivans in 2025 will be as aerodynamic as 2014 Ferraris. As a father of three, I wish I had one of those vans when I was a few years ago. The TAR assumes that the adoption of Atkinson engines will be, I think, at 43 percent in 2025 and we don't think that is practical. The TAR assumes that the low-hanging fruit which allowed us to overcomply, and much of the panel discussion at the beginning was how we are overcomplying and in fact we are, was on the basis of the low-hanging fruit, and we don't believe that it is a given that that low-hanging fruit will regenerate.

So there are a lot of challenges here. And as I closed with my testimony with, the downside risk of being wrong is enormous. And so we have got to make sure we do this right. We have got to work together, but the implications are definitely profound.

Mr. BURGESS. Thank you.

Mr. Bozzella.

Mr. BOZZELLA. Yes, Mr. Chairman. I agree with much of what Mitch said. I want to step back a second. I think the agencies worked very hard, and you heard about different models and different baselines, and it is a very complex analysis. And so, look, we appreciate the attention they are giving to it. We are working through the analysis. We also will file comments Monday, but we are going to keep that analysis going. We think that there is more work to be done and we appreciate a fact-based and scientific analysis. We have to make sure. This is the point. This is their reality check to make sure we get it right.

I think there are a couple of areas where we really need to understand the regulators' assumptions. I think the technologies required are an important set of assumptions to probe. There is not a single conventional fueled vehicle in the market today that meets

the 2025 standards in any footprint, not a single one. So we have a lot of work to do.

I am bullish on the industry's ingenuity. I have bet my family's security on it for 15 years or more, so I believe in it. But we have a task. Not a single gasoline, not a single conventional vehicle meets those standards today. Strong hybrids do, electric vehicles do, so there is a question. Is it true that we can meet this mostly with conventional powertrains? Obviously we are innovating in both places. Lots of innovation with regard to conventional powertrains and lots of innovations with regard to advanced technologies.

But that is a really important question for the customer, right, because these technologies may require differences in driver behavior. And so this is, the customer needs to be at the center of this discussion.

Mr. BURGESS. Thank you. And just a personal observation, I mean, I do drive a strong hybrid. I got on the waiting list to buy that vehicle in 2003, long before the 2007 energy bill passed. It took awhile to get it, so I didn't actually take delivery until 2004.

But my principal reason for buying was because I thought the technology was cool. I had heard about it in a Science Committee hearing in 2003, and I thought what a great idea. So when I put my brake on, it charges the battery that then I can then use to start the car, and when I stop in the drive-in window in Jack in the Box, my engine is not running while the clerk fills the order.

So I respect very much what you said about the consumer. And my comments at the beginning, we ignore the consumer at our own peril both as a legislative body, sort of the regulators that were on the panel before, and you of course as the manufacturers and people who are supplying consumers what they want to buy. It is a powerful force, and we must not ignore it.

I am going to yield to the gentlelady from Illinois, 5 minutes for questions, please.

Ms. SCHAKOWSKY. Thank you, Mr. Chairman.

Dr. Graham, a quick question. Isn't it true in your supplemental testimony that you indicated that your program is funded by the automotive industry?

Dr. GRAHAM. Yes. We have a grant from the Alliance of Automakers.

Ms. SCHAKOWSKY. Thank you.

I wanted to ask Mr. German a question: Can you address how allowing for too many credits could undermine the goals of the CAFE standards? Put on your microphone, please.

Mr. GERMAN. Yes. Let me specifically talk about off-cycle credits just to illustrate, and these are technologies that improve efficiency in the real world that do not appear on the official test cycles. And in theory it is a great idea and it is a concept that ICCT supports.

But the devil is in how you do the calculations and how you award the credits. It is very easy to double count the credits so that some of the credits that occur on the cycle you also award them off-cycle. It is also very difficult to assess the amount of off-cycle credits that actually occur in the real world.

And the reason for this is that we don't have any real-world data on how consumers drive. We have it for isolated areas. EPA has

some data from Kansas City. But if you want to give credits, you want to do this over the Nation, year-round basis, data doesn't exist. We are recommending that the agency cooperate with DOT and the manufacturers to do a program specifically to gather this data. This would also allow the off-cycle credits to be standardized. The manufacturers have petitioned for the off-cycle credits to be streamlined. This would be a great way to do it is get a national data set everybody can use and have the same credits for all.

Ms. SCHAKOWSKY. Thank you.

I wanted to move now to Mr. Cooper. Several witnesses in this second panel have discussed the impact of differing payback methods, payback periods rather, for fuel economy on consumers' choice of vehicle models and options. Regardless of the length of this period, consumers are indeed getting a payback; isn't that correct?

Dr. COOPER. Sorry. I usually don't need a mike, I speak so loudly. Consumers actually say they accept the 5-year payback given this debate about how long the payback period should be. But the fundamental point is that EPA and NHTSA have both concluded that the payback is less than half the life of the asset, and we like to use that as the absolute bottom line. If there is that much savings, it means that people are likely to make money.

Second of all, you have heard that most consumers would love to walk into the auto dealership and get paid back in 3 years. That is not the world they live in. Ninety percent of them you heard finance them and so it is a cash flow world for the average consumer. And if you look at the cash flow impact even at the EPA and NHTSA standards, you will discover that under most assumptions, 75 percent of those assumptions, they are cash flow positive in the first year. That is because they lower the total cost of driving, and that is what these folks keep ignoring. They ignore it and they make it go away by assuming costs that are through the roof, two to five times as much as EPA and NHTSA.

So now the difference comes down to do you believe their costs or do you believe the agencies' and history which has always shown that the capitalists do a good job? They are not dumb. They don't stand still. They put the least-cost things in the vehicles. So these are cash flow positive in the first year. They have a payback period of less than half the life of the vehicle, and that means they are good for consumers. It turns out they are especially good for low-income consumers who are driven by operating costs.

Ms. SCHAKOWSKY. I think that is a really important point. Vehicle costs are rising due to many changes in new vehicles, not just fuel economy—enhanced performance, greater safety features, greater comfort, and other amenities. While all of these things have costs which can be estimated, only one has the benefit that is easily converted to a dollar value and directly results in monetary benefits to the person who bought the vehicle, and that is fuel economy.

A consumer may be willing to pay for any or all of the other features, but none of them result in a direct payback to the consumer. Have the agencies received comments to indicate public support for strengthening the CAFE and greenhouse gas standards in accordance with these rules?

Dr. COOPER. We have been surveying on these, the question of standards for 12 years. Prices are as high as 4.50 and as low as \$2. Eighty percent of the respondents to our survey support standards. They understand that it is good for them. They hate the volatility. They hate high prices. But they also hate not knowing whether it is going to be \$4 or \$2. So we find consistent, strong support for the standards program.

Ms. SCHAKOWSKY. Thank you. I yield back.

Mr. OLSON [presiding]. The gentlelady yields back. The Chair calls himself for 5 minutes for questioning. First of all, a warm welcome to all six witnesses and a special warm welcome to a fellow Rice University alumni, Mr. Bainwol. Owls always support Owls. It is good to have all of you here this afternoon.

My first question is for you, Mr. Welch. Your opening statement expresses concerns that these rules will force dealers into a position where they won't be able to provide the cars and trucks that people want to buy at the prices they can afford. For example, a dealer back home, he has electric cars on his lot. They take up spaces, parking spaces on his lot. They sell for days, maybe weeks. Meanwhile, he is exploding with sales of pickup trucks and SUVs, but these sales are curtailed because he doesn't have the space on his lot because of these electric vehicles.

So my question is, Do you think that is the exception or the rule going forward, Mr. Welch?

Mr. WELCH. I actually think it is the exception. There is a big misconception. Dealers actually buy the cars from the manufacturers. They pay for them on the railhead, and they put them in their inventory. Dealers are merchants. They stock, sell, and service what their consuming public want to buy, own, and drive. So it is a big misconception that we are going to buy a vehicle and put it in our inventory that isn't going to sell, because we are paying flooring on it on a monthly basis.

So the dealers control, by and large, and they are required under their franchise agreements to stock representative vehicles for demonstration purposes and whatnot. But I think what a lot of people miss is that the buying process has changed so dramatically in the past several years.

You know, there is a purchase funnel and, you know, we seem to get sort of a bad rap that we are not pushing electric cars and so on, when the fact of the matter is, is everybody is shopping on the Internet these days. The average car shopper spends 13 1/4 hours researching cars. That is for new cars. It is over 15 hours for used cars. A recent Autotrader study indicated that 72 percent of customers that come into the dealership have already decided which vehicle they are going to buy regardless of how good of salespeople we, quite frankly, retain on our lot.

So to get back to your question, yes, we will have as many electric vehicles on stock as we anticipate. A dealer typically keeps a 60-day supply, is the general rule of the thumb, and whatever their 60-day supply of pickup trucks is going to be different than their 60-day supply of electric vehicles. Other than California, as it was pointed out here, the actual number of pure electric battery vehicles that we sell this year is only 0.4 percent on a national basis.

Mr. OLSON. The next question is for Mr. Bozzella and Mr. Bainwol. The industry was promised explicitly a uniform and harmonized set of national standards affecting fuel economy and greenhouse gas emissions, not a patchwork of conflicting requirements. Which one did you get?

Mr. BOZZELLA. Well, certainly it was an aspirational goal, and we have not achieved that aspiration yet.

Mr. OLSON. So the patchwork. Mr. Bainwol.

Mr. BAINWOL. I will confirm that, and if I can take one second to—

Mr. OLSON. You bet.

Mr. BAINWOL [continuing]. Augment something Mr. Cooper said. We too found that 80 percent of the public supports the standards. The next question, though, is the one that I think is the essential crux of the challenge. We then asked how much would you pay in order to reach those standards? Fifty-three percent of the public said under a thousand dollars; 12 percent of the public said over \$2,500. The delta is that or more. That is the fundamental math problem.

There may be more value for the consumer, but that is not their perception. And at the end of the day, it is the customer who is making the choice, and this shows that the economics are really challenging for them.

Mr. OLSON. Yes. So a follow-up to what are some of the differences between EPA credit trading programs and NHTSA's program, and why this difference is a problem. Mr. Bozzella. Mr. Bainwol.

Mr. BAINWOL. There are differences in when they kick in, there is differences when they expire, and there are differences in how they get traded. And it is a problem, because at the end of the day when you comply with two different programs, and in this case you are complying with a more stringent EPA program, you still have additional costs to comply with a program that is not met. And that produces costs that get built into the vehicle and makes it harder for consumers to buy the product.

Mr. BOZZELLA. Yes. And the only thing I would add to that, Congressman Olson, is that the point of these credits is to reward innovation and to encourage overcompliance. And so to the extent that we take our eyes off the ball and instead of having one streamlined set of rules for good competition and good racing and great results for the customer, we have to spend more time trying to understand how to move things around to comply. And so I think it has an impact on innovation.

Mr. OLSON. One final question. I am over time, but who can best fix this problem, either the midterm evaluation or Congress? And who is the best to fix this problem, because it is there it sounds like.

Mr. BAINWOL. I think it takes all parties. Congress will have to fix the harmonization piece, then everybody working together will have to make sure that the stringency is consistent with consumer behavior.

Mr. BOZZELLA. I would agree with that.

Dr. COOPER. Is that an open question for everybody?

Mr. OLSON. Yes, Dr. Cooper.

Dr. COOPER. Well, look, you know, Congress could do it. Although I worked on EISA and so forth, the question is who is going to get it done faster and better? And it is not entirely clear that Congress is the best entity. If you look back at the acid rain program, we would have been better off if the agency had been allowed to raise the standard because the industries did such a good job of hitting the target by Congress. So it is debatable who will get it done faster and who will get it done better. And it is perfectly all right for everybody to talk about it, but EPA and NHTSA under the current law are going to have to do something in the time frame of the midterm review. Congress might.

Mr. OLSON. So industry first, Congress second is the preferred route.

Dr. COOPER. I said let's have a good debate, but remember, EPA and NHTSA have to do something. And if you can produce a better solution here in that time frame then you will, and EPA can't stop you from doing that.

Mr. OLSON. You bet.

Dr. COOPER. And so then that is fine. It is a good debate. But they have to do something because they have to write a new rule for the next round under the law.

Mr. OLSON. Thank you, Dr. Cooper, and I am out of time. I yield to the gentleman from New York, Mr. Tonko, for 5 minutes.

Mr. TONKO. Thank you, Mr. Chair, and gentlemen, welcome. So Mr. Bozzella and Mr. Bainwol, what is the lead time for on designing your vehicles, and for instance when will plans be finalized for model year 2025?

Mr. BOZZELLA. The lead time for vehicles is years, right. So, you know, this is why this discussion is really important, why we have to make sure that the assumptions built into the Technical Assessment Report about advanced technologies are accurate, because we are looking at technologies now, certainly in the case of electrification that do exist, but in the cases of internal combustion engines that don't necessarily exist in the marketplace yet. So we have a lot of work ahead of us.

Mr. TONKO. Mr. Bainwol.

Mr. BAINWOL. Somewhere between 3 and 7 depending on car and truck and what is going on in life, but it is a long product cycle.

Mr. TONKO. Is there a shorter period for the time for a car?

Mr. BAINWOL. I believe it is shorter for cars.

Mr. TONKO. OK. And Mr. German, you mentioned a number of innovations being developed and deployed. In your opinion, what are the biggest technology advancements that have allowed manufacturers to exceed targets thus far?

Mr. GERMAN. The study we focused and the technologies I mentioned were actually technologies that are just starting to hit the market now. And so they are going to provide additional benefits beyond those that were forecasted in the rulemaking 5 years ago.

As far as what is in the market now, certainly the biggest technology has been Mazda's SKYACTIV engine which is 10 to 15 percent more efficient than naturally aspirated engines were previously. And so Mr. Bainwol referred to the 43 percent penetration for Atkinson cycle engines in the TAR, it was zero in the rulemaking because they didn't think naturally aspirated engines could

compete. It has completely changed the whole way that EPA and NHTSA are viewing technology.

And I will also point out that it shows that there is a lot of different ways to comply, so manufacturers will go naturally aspirated, some will go turbo-charged, some will choose other routes.

Dr. COOPER. Can I make a point here about this 43 percent? Because I believe, I was very impressed to notice that NHTSA only has it at 18 and they still comply. And that is exactly the point. Now I need to check that. But, so EPA at 43, NHTSA 18, and under both you comply. That is the flexibility of the act. Subject to check I want to put that in the record.

Mr. TONKO. OK. Thank you for placing that in the record. Now back to Mr. German. That efficiency effort, the technology gains have been moving at a rather robust pace. Can we expect, do you expect that that pace will continue?

Mr. GERMAN. Yes. I don't think there is any question about it, and it is because computers are actually the revolutionary technology. Computer simulations, computer-aided design is allowing things to occur in the development of all technologies that was never possible before. And it is particularly important for lightweight materials, because the simulations are getting to the point where the manufacturer can simultaneously optimize the shape, the size and the material of every part simultaneously. It has never been possible before.

Mr. TONKO. And do you believe that these CAFE goals can be met with improvements primarily to the conventional internal combustion engine, or will electric vehicles and hybrids for instance need to become a much bigger part of our fleet mix?

Mr. GERMAN. Well, one of the new trends that is happening is lower cost 48-volt hybrid systems. This stays below the 60-volt lethal threshold which has some additional cost savings, and everything I am seeing from a lot of suppliers says that you can get over half the benefits of a full hybrid at only about a third the cost.

So I do include 48-volt hybrids into conventional technology, but as long as we are willing to stipulate that some of these 48 volts are happening, then yes, with all the other technologies that are coming that are hitting production now that were not anticipated that is all that is going to be needed for the large majority of manufacturers to comply.

Mr. TONKO. And these technologies that you mentioned, will they be available for the manufacturers for their final design time frame?

Mr. GERMAN. Yes. I mean all of them I mentioned are in production now. Miller cycle just hit production, e-Boost just hit production. Mazda's engine has been in production for 2 years now. And the other technologies I have talked about will, at least one manufacturer has announced production intent already. So yes, they will be readily available to all manufacturers by 2025.

Mr. TONKO. I thank you. With that Mr. Chair, I yield back.

Mr. OLSON. The gentleman's time is expired. The Chair calls on the gentlelady from Tennessee, Mrs. Blackburn, for 5 minutes.

Mrs. BLACKBURN. Thank you, Mr. Chairman, and thank you all for your patience with our hearing today. I know you are fully aware we have got another hearing going on and it is over in the

Rayburn Building, so we are having to jump back and forth while our hearing room, our main hearing room is remodeled and updated. But Chairman Upton says, don't worry, the room will still be Michigan green. That that part of the decor is going to change.

I had appreciated the first panel and the opportunity to talk with them just a little bit about harmonization and looking at this program. And Mr. BAINWOL, I think I want to come to you on this. When you look at the harmonization gaps between the National Program and, say, California's program, tell me how you think we go about addressing that. How do you fill in those gaps? What is the best way to kind of plug that in?

And then I am going to come to you all in a consumer choice question too, so let me hear from you on that.

Mr. BAINWOL. Sure. The harmonization piece with California is really complex. California is able to do what it does under a waiver from EPA, and it is not clear to me whether Congress would choose to adjust that or not and we are not in a position where we are advocating that.

What I would say is that the existence of two different consumption mandates produces some serious challenges. You have CAFE which requires fuel efficiency and carbon reduction, and you have ZEV in California and the other States that requires essentially electrification. And so there is an investment going in both in R&D for electrification and an investment going in to subsidize the moving of the metal for electrified products because they are not selling that well. And that is investment that could go into complying with CAFE.

So the existence of two programs absolutely produces challenges and regulatory friction. And I would note that we talk a lot about not needing electrification and hybrids in order to comply with CAFE, but we have to produce electrics to comply with ZEV. So that is an academic point. We have to produce those to comply with ZEV, which means those costs are there. Those costs are not in the TAR.

Chairman Olson, you asked about what was missing in the TAR. That is one of the challenges with the TAR, they didn't embrace or accept or talk about the cost of ZEV. That is a serious challenge.

Mrs. BLACKBURN. OK. So all of this regulation, how much cost does it add to the price of an average vehicle?

Mr. BAINWOL. We don't have a locked in number yet. The TAR has been out obviously since July. We did not get an extension on the period to respond, but we are doing analysis. There is a range of estimates that go anywhere from, you know, \$1,500 to over \$6,000, but the critical point is that car prices are being moved not just by CAFE and not just by ZEV.

ZEV as I said is \$356 per car. It is also being moved by other very well intended and meaningful social objectives in the safety zone and elsewhere, in fuel quality. So the car price question is really critical because we want to make sure as Peter stressed that affordability remains paramount.

Mrs. BLACKBURN. Yes. In my district in Tennessee with the presence of the auto industry and with the presence of many who have moved from California to Nashville that are connected to the auto industry, one of the things that comes up in our meetings regu-

larly, town hall meetings or just discussions at civic clubs and things, is looking at the CAFE standards and looking at what that does to safety of the car, the changing of materials, going for lighter weight materials, and consumer choice comes into play in that.

And I just think about the auto dealers who have to buy a certain amount of product, and yet it may be a product that the consumer does not like or does not want. And I wonder when we are going to hit that threshold on the efficiency issue and what the consumer likes or wants.

And you mentioned consumer choice in your testimony, and I have got just a couple of seconds. I would like to hear just one little statement from you on it. Yes, go ahead. Mr. Welch.

Mr. WELCH. We have literally hundreds of models. And as I mentioned before, under our franchise agreements we stock every line, make and model so that we can have them for demonstration purposes. But the real issue is what do we reorder, OK. And virtually, as I mentioned again before, we are merchants. We are not much different than the hardware store. We have got bins of widgets and if they sell we restock them and what not.

So it is complex. The issue really goes back to the affordability issue. We are so fortunate in our country that we have such a wide array of different options that we provide consumers based on the consumer, and every single sale is different. Every different person has a different budget constraint. They have a different utilitarian need for the vehicle. They have got different commute patterns. And we have got product, it is amazing the product of the manufacturers and we just take it for granted, quite frankly.

But the fact of the matter is as manufacturers are effectively forced under these regulations, even though there is flexibility to add certain types of technologies, and once they make that decision 3 to 7 years in advance they have got to go through the manufacturing process. And, you know, if the demand and the consumer preferences are different 3 or 4 years from now and it may be based on a safety attribute, it may be based on a fuel economy attribute, but, you know, we are not clairvoyants when it comes to that.

But it is the cost, it is the cost, it is the cost, the affordability and the utility that is offered to the consumer.

Mrs. BLACKBURN. Thank you. I yield back.

Mr. OLSON. The gentlelady's time is expired. The Chair calls upon the gentleman from Texas, Mr. Green, for 5 minutes.

Mr. GREEN. Thank you, Mr. Chairman, and again thank our panel for their patience. Dr. Cooper, according to the 2015 American Community Survey, nearly 60 percent of our district qualifies as a low income. How does this program impact low-income households?

Dr. COOPER. Well, as we have explained in testimony and we explained in 2012, and EPA has followed up on that low income are much less likely to be in the new car market. They are in the used car market. And if you look at their expenditure pattern, their total cost of driving, the biggest component, the much bigger component is operating costs. Higher fuel economy lowers the operating cost so they get the benefit of that.

It turns out when you buy a used car people will hold their cars the life of their loan, 5 years. They sell the car, it is going to last another 5 years. It is going to save gasoline for another 5 years. Does that savings get reflected in the resale price? Actually, only part of it does. So low-income consumers get a disproportionate share of the second 5 years. Low-income consumers also are the beneficiaries, as I say, of these indirect effects, environmental and public health, so they will be significant beneficiaries of that.

The interesting thing is if you go to year 2022, which is what we are talking about now, almost every used car sold in 2022 will have been subject to the rebooted CAFE standard. 10-year life, the average car, they have all been covered by standards, and that means low-income consumers are benefiting from the reboot of the CAFE program. This is one of the great myths. Low-income people benefit because they benefit from lower operating costs, and this program is helping them as a class.

Mr. GREEN. Well, I have to admit, and I have some older cars, but the older your car the more maintenance you have to do. And also if they keep it, then the CAFE standards are of a different generation than what may happen on the newer cars.

Dr. COOPER. That is absolutely the case. But on the other hand, those cars were required to be more fuel efficient by the new standard and that is the remarkable thing by 2022.

Mr. GREEN. In your testimony you point out that the industry has found lower-cost ways of complying with the standards than originally thought. What are some of the ways that this was accomplished?

Dr. COOPER. Well, the most obvious one is the Atkinson engine. It wasn't even considered. The second of all, what happens is that when people are given a 10-year time frame they ain't dumb, they took a look at it and say what am I best at; what else will I be changing? And so what the regulators thought the cost would be is always too high. What the industry political arms said the cost would be is way too high. We have got dozens of studies of that.

And so the natural process of capitalist markets, they bring the costs down, they learn the learning curve is very, very steep in the beginning, and so you can find specific technologies that came along like this aspirated engine. You can find the general process. But this has happened dozens and dozens of times over the last 3 decades as we have dealt with the issue of improving fuel economy.

Mr. GREEN. Mr. German, the initial costs for estimates complying like what Mr. Cooper said is actually much lower than the manufacturers or even the agencies. In regards to this program, have compliance costs been overstated, and what is the primary factor in overstating this compliance?

Mr. GERMAN. Yes. No, it is just innovation. I have only talked in my testimony about the major improvements you can put a name to, but in the series of reports that we are doing in cooperation with suppliers we have all kinds of small things that have happened that were not anticipated. Variable geometry turbo-charger from a diesel engine which is highly efficient, it doesn't work on a conventional gasoline turbo-charge, but it does if you add Miller cycle.

So there are all kinds of little secondary benefits that the suppliers, and I am sure the manufacturers as well, are figuring out that taking little steps to improve efficiency and reduce cost and the cumulative effect of these things is quite large.

Mr. GREEN. OK. And how should we project for the new technologies given the rate of new development and adoption? I mean do we have a crystal ball?

Mr. GERMAN. Yes. I mean that is the single biggest problem with innovation. You can't project it. And that is why what I really try to push is the concept that the least you can do is to use the latest data possible and get as close you can, because if you are using older data you are guaranteed to be wrong. You are guaranteed to be missing innovation.

Mr. GREEN. OK. Thank you, Mr. Chairman. I yield back.

Mr. OLSON. The gentleman yields back. The Chair now calls upon the gentleman from the Commonwealth of Virginia, Mr. Griffith, for 5 minutes.

Mr. GRIFFITH. Thank you very much, Mr. Chairman. I guess I am going to look first to Mr. Welch and Mr. Bainwol. Your responses, do you think the industry can get me a cheap car for my five-member family? And as you can tell by looking at me I am not small and my children probably aren't going to be small either. Can you get me a car that is \$22-23,000 that I can fit them all into that is going to have all these technological advantages and get it to me at \$23-24,000?

Mr. WELCH. For a new car, stripped models which most people want more accoutrements on, but—

Mr. GRIFFITH. Well, I am a stripped-model guy, but OK.

Mr. WELCH. Well, that is fine. But, you know, our least expensive car I believe that we have on the lots right now is the Nissan Versa that is just under \$13,000, and of course they go all the way up.

Mr. GRIFFITH. I understand that. But can I get all five of those people in there comfortably? I don't think I can.

Mr. WELCH. No.

Mr. GRIFFITH. I have spent more hours, and somebody gave the statistic people spending 13 hours on the Internet. I have already spent more than that anticipating when I trade in my Volkswagen diesel and the deal gets approved.

But I do think both of you made the point that price makes a difference, and it does make a difference. Because I looked any number of times when I was driving my older vehicle, the one that I traded in for the Volkswagen diesel, and I drove that for 376,000 miles before the axle broke and my wife said you have got to get rid of it. I am tired of no hubcaps and the windows being held up with duct tape. So I am that cheapskate, but the price does matter.

And I noticed, Mr. Welch, in your testimony you said even on a monthly basis, because I think it was Dr. Cooper who testified it is about the cost of maintaining the vehicle and so forth which includes the loan value or the loan cost that even \$20 to \$30 that your dealers would say that makes a difference on what car they are going to buy, or in the case of somebody like me whether or not I buy.

And then Mr. Bainwol, you indicated—and you can correct me and jump in anywhere on this—but you indicated that TAR was

going to add anywhere, in an average in talking with the gentlelady from Tennessee, 1,500 to 6,000. So I quickly pulled out the Internet loan calculator and figured 1,500 at 3 percent, which I think would be fairly reasonable in the middle if there is not some special deal, and that hits your number, 26. It comes back at 2,695 and that is right smack dab in the middle of the number where people start deciding they are going to get a different car or not buy at all.

Am I accurate in those assessments that I have made that some people are going to walk away completely from the new car and some people are going to downsize?

Mr. BAINWOL. I would say that the fundamental point you are making is that you have to do a whole-car cost analysis. And we have a tendency in this town to look at policy from a silo, so today we are talking about CAFE and we have kind of brought in ZEV because that introduces more cost and it is related.

But we also talk about things like V to V, and an issue that Congressman Schakowsky talked about, the rear visibility. There is lots of things that go into the price of a car that are great technologies that serve important social purposes, but at the end of the day they cost money. And when you load them all up and you do the whole-car cost analysis you are creating a world in which it becomes harder and harder to purchase a new car.

And with all due respect to my friends on the panel, that disproportionately hurts and locks out of new cars low-income Americans who then do not get the benefits of the safety technologies that have been introduced in the last 5 to 10 years.

Mr. GRIFFITH. Well, and let's face it, and I am going to ask you a question at the end of this, I could afford the more expensive car. But if it is so much more expensive that I walk away from the market, I am never selling the used car that Dr. Cooper wants me to sell to some low-income person at the end of 5 years or 6 years or 8 years or even if I were able and could in my conscience spend that much money on a car and buy it, I am likely to drive it longer than the 5-year lifespan because I am getting good service or good mileage out of it and it is never going to be available, at least not mine. I understand I may not be typical, but it is never going to be available for the low-income person until the axle breaks and it is all falling apart and it is time to take it to the graveyard. I yield back.

Mr. OLSON. The gentleman yields back. And that is all for the members and their questions. On behalf of the Commerce, Manufacturing, and Trade and Energy and Power Subcommittees and this committee, thank you, thank you, thank you to our witnesses.

I would like to ask unanimous consent to enter into the record a letter from the American Chemistry Council about this hearing. Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

I remind all Members you have 5—you have 10 legislative days for questions for the record. Without objection, this hearing is adjourned.

[Whereupon, at 1:24 p.m., the subcommittees were adjourned.]

[Material submitted for inclusion in the record follows:]



American Chemistry Council
Statement for the Record
House Energy & Commerce Committee
"Midterm Review and Update on the Corporate Average Fuel Economy Program and
Greenhouse Gas Emissions Standards for Motor Vehicles"
September 22, 2016

The American Chemistry Council (ACC) appreciates the opportunity to comment on the House Energy & Commerce Committee hearing entitled, "*Midterm Review and Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles*." The American Chemistry Council, which is committed to sustainable development by fostering progress in our economy, environment and society, represents some 185 companies engaged in the business of chemistry, an innovative \$797 billion enterprise that is helping solve the biggest challenges facing our nation and the world.

The business of chemistry, which includes manufacturing of lightweight plastics and polymer composites used by the transportation industry, creates over 800,000 manufacturing and high-tech jobs, plus six million related jobs that support families and communities. The products of chemistry, such as plastics and polymer composites, make it possible to provide clean air and water, safe living conditions, efficient and affordable energy sources, lifesaving medical treatments and safe and innovative transportation solutions. Plastic and polymer composite products contribute robust and distinct economic benefits to our nation. Produced at 1,572 plants in 45 states, employing over 54,000 people and featuring a payroll of over \$2.5 billion, advanced plastics and composites in the automotive sector have doubled in use over the last twenty years.

Advanced materials such as plastics and polymer composites are helping to solve many of our nation's transportation challenges, including those faced by automakers to meet greenhouse gas emissions standards and fuel efficiency standards for light-duty vehicles. Developing technology to solve these challenges is a critical requirement to help vehicle manufacturers achieve greenhouse gas emissions and fuel economy requirements. Government has an important role to play in ensuring that data and standards exist to achieve lightweighting, while maintaining consumer preference. Together, the plastics and polymer composites industry can successfully harness new and innovative vehicle technology to help manufacturers achieve maximum fuel efficiency and a reduction in greenhouse gases.

ACC applauds the Environmental Protection Agency and the National Highway Traffic Safety Administration and their efforts to create a sustainable transportation platform. ACC supports these efforts and the agencies' recognition in its *Draft Technical Assessment Report for Model Year 2022–2025 Light Duty Vehicle GHG Emissions and CAFE Standards*, (81 Federal Register 49217–49220) of lightweight plastic and polymer composites technologies, which, among other numerous benefits, play an important role in improved design, mass reduction, aerodynamic



improvement, and optimized component integration. Utilizing plastic and composites within the global automotive industry follows well-documented trends of polymer usage to reduce mass and increase efficiency in the civilian and military aerospace industries. Choosing plastic and polymer composites to reduce mass in light-duty vehicles is a decision supported by science that can pay immediate and long term dividends.

The Role of Plastic and Composites in Mass Reduction for Light-Duty Vehicles

Vehicle lightweighting is one of the strategies to achieve reduced greenhouse gas (GHG) emissions and fuel consumption, including techniques for improved design, aerodynamic drag improvement, and optimized component integration. This is an area where lightweight plastic polymer composites can play a significant role in improving the design of new light-duty vehicles. In the last 47 years, the use of lightweight plastics in U.S. automobiles grew from an average of 60 pounds (27 kilograms) per vehicle to approximately 330 pounds (150 kilograms) per vehicle in 2014. More than 50% of a typical vehicle's volume is composed of plastics and polymer composites, but these materials only account for approximately 10% of total vehicle weight.

Plastic composites are a combination of tough plastic resins, reinforced with glass, carbon fibers and other materials. These plastic composites are lighter weight than traditional automobile materials, yet maintain high levels of strength and a high resistance to corrosion. Plastic and composite materials provide a way to safely lightweight vehicles while preserving consumer preference through improved design flexibility. Additional properties of plastic and composites, including strength to weight ratio and excellent energy absorption, make these materials ideal for the design and manufacture of light-duty vehicles. The chart labeled "Figure 1" below provides data regarding the tensile strength and density of filled plastics, polymer composites, metals, and alloys. As shown in the chart, there are many plastics and polymer composites that are significantly less dense than most metals and alloys while offering similar tensile strengths. These data illustrate the fundamental physical advantage that many plastics and polymer composites can offer over metallic automotive materials: higher strength-to-weight ratios enable automakers to lightweight while maintaining performance.¹

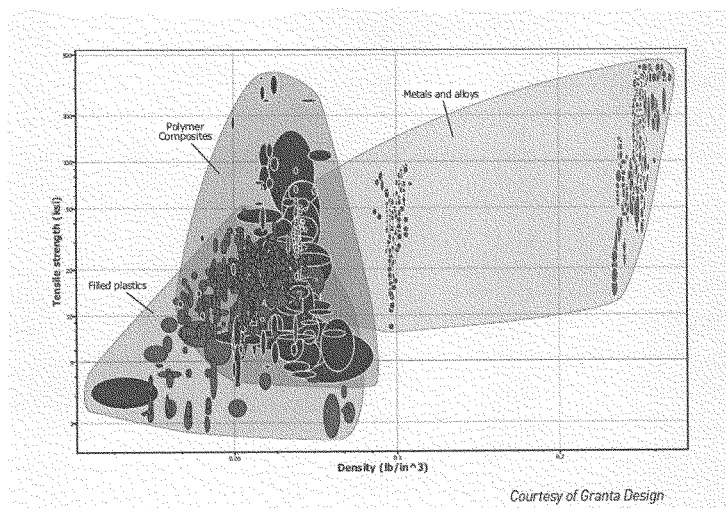
As vehicles across the board begin reducing weight to comply with the proposed 2022–2025 Light Duty Vehicle GHG Emissions and CAFE Standards, new lightweight vehicle architectures will emerge. Lightweight plastic and polymer composites have the characteristics needed to help deliver energy saving results while supporting the innovative designs that consumers demand.

In 2014, ACC's Plastics Division published a detailed report titled "[Plastics and Polymer Composites for Automotive Markets Technology Roadmap](http://plastics-car.com/Tomorrows-Automobiles/Plastics-and-Polymer-Composites-Technology-Roadmap)."^{1d} This roadmapping process engaged technical experts and leaders from the automotive and plastics and polymer composites industries, including perspectives from original equipment manufacturers, tier suppliers, material developers, researchers, federal agencies, and consultants, to discuss the current limitations to the increased use of plastics and polymer composites and to identify industry-wide actions that can

¹ ACC. "Plastics and Polymer Composites for Automotive Markets Technology Roadmap," 2014, <http://plastics-car.com/Tomorrows-Automobiles/Plastics-and-Polymer-Composites-Technology-Roadmap>



Figure 1 Tensile strength versus density for filled plastics, polymer composites, and metals and metal alloys



accelerate the increased widespread use of these materials in future vehicles. The roadmap synthesizes the findings from this effort through 2014 and sets a path forward for the plastics and polymer composites and automotive industries through 2030. This roadmap is designed to help the automotive and plastics and polymer composites industries maintain a strong foundation upon which to build partnerships and initiate collaborative programs that address changing market needs. Implementing this roadmap will require significant resources to accomplish both shorter-term priorities and the long-term vision for 2030 and beyond. We would be pleased to meet with the Committee to further discuss our roadmap implementation efforts so that the information can be effectively leveraged to meet the objectives of 2022–2025 Light Duty Vehicle GHG Emissions and CAFE Standards.

Component Integration Benefits

Component integration can reduce weight and decrease manufacturing costs. Cutting edge plastic and composite technology allows manufacturers to optimize parts consolidation and component integration. Choosing plastics allows manufacturers to adopt modular assembly practices, lower production costs and improve energy management. An example on a 2010 vehicle is illustrated by an all new plastic two-shot window lift carrier plate that replaces a metal-intensive assembly comprising 21 components produced with 16+ processing and assembly steps with a plastics-

intensive, 10-component unit produced in 10 assembly steps.² The versatility of plastic and composites can revolutionize component design, reduce weight and cut manufacturing costs.

Aerodynamic Drag Improvement

Tough, light weight and versatile plastic and composites allow manufacturers to employ advanced styling techniques for sleeker, more aerodynamic exteriors. Aerodynamic enhancement features on light-duty vehicles often utilize lightweight plastics that add very little weight and maximum design flexibility, translating into large efficiency gains. Lightweight plastic and polymer composites also have excellent durability with damage and corrosion resistance compared to the traditional steel and aluminum alternatives. Those characteristics, along with the benefit of low tooling manufacturing, also make plastic and polymer composites a viable material for side trim, air dams, underbody covers, and more aerodynamic side view mirrors. Additional aerodynamic technologies utilizing polymers can change vehicle shapes, reduce frontal area and seal gaps in body panels. The function of aerodynamic technologies and lightweight plastic and composites go hand in hand for they both have the ability to reduce GHG emissions and fuel consumption.

Plastic Sustainability Benefits

ACC applauds the agencies' consideration of plastic and composite sustainability in the Draft TAR. In addition to the number of emerging technologies and analyses cited, ACC would like to call attention to a new study from Trucost entitled "*Plastics and Sustainability: A Valuation of Environmental Benefits, Costs and Opportunities for Continuous Improvement*"³ which finds producing consumer goods, including automobiles, with plastics can help lower environmental cost. The report finds that using plastics instead of alternative materials makes vehicles lighter so they use less fuel, saving 323 million liters (89 million US gallons) of gasoline and diesel over the lifetime of vehicles in North America. This results in savings to the North American economy of \$2.4 billion in environmental costs over the lifetime of cars sold in 2015, or a net environmental savings of \$162 per car in North America.

Safety Benefits

The high strength and energy absorption properties of polymer composites can also improve crash safety by strengthening vehicle compartments to help protect passengers during crashes.⁴ Lightweight plastic and composite materials have the ability to reduce vehicle weight without compromising safety, and Congress has taken steps to recognize that fact. Over the last 9 years, Congress has directed NHTSA to create a safety roadmap for lightweight Plastic and Composite

² "Two-Shot Window Lift Carrier Plate," *Plasticscar.blogspot.com*, November 21, 2012, <http://www.plasticscar.blogspot.com/2012/11/two-shot-window-lift-carrier-plate.html>

³ "Plastics and Sustainability: A Valuation of Environmental Benefits, Costs and Opportunities for Continuous Improvement", *Plastics.AmericanChemistryCouncil.com*, July, 2016, <https://plastics.americanchemistry.com/Plastics-and-Sustainability.pdf>

⁴ Aviva Brecher and John Brewer, Volpe National Transportation Systems Center, and Stephen Summers and Sanjay Patel, National Highway Traffic Safety Administration, Characterizing and Enhancing the Safety of Future Plastic and Composite Intensive Vehicles (PCIVs), <http://www-nrd.nhtsa.dot.gov/pdf/esv/esv21/09-0316.pdf>



Intensive Vehicles (PCIVs) through the THUD Appropriations bills. The report, titled “A Safety Roadmap for Future Plastics and Composites Intensive Vehicles”⁵ and published in 2007, evaluates the potential safety benefits of PCIVs to enable their deployment by 2020. ACC continues to work with the entire automotive value chain, including its member companies, automakers, research universities, and government agencies (including NHTSA) to address the Composites Roadmap action items.

In support of the Roadmap’s implementation, NHTSA conducted a study to lightweight a 2008 Silverado by approximately 20% utilizing plastic and polymer composites. The lightweight study vehicle was shown to maintain equivalent safety based upon NCAP test results.⁶ The study, entitled “Investigation of Opportunities for Lightweight Vehicles Using Advanced Plastics and Composites” was finalized and published by NHTSA in 2012.

ACC applauds the Energy & Commerce Committee for its efforts to advance innovative technologies in the automotive sector. ACC supports this work and highlights the increasingly important role of lightweight plastics and polymer composites in manufacturing innovative automotive technologies. We look forward to continuing to work with the Committee, Congress, and all stakeholders on the development of emerging technologies and manufacturing processes that improve fuel economy and auto safety.

⁵ NHTSA. “A Safety Roadmap for Future Plastics and Composites Intensive Vehicles” (DOT HS 810 863), 2007; <http://www.nhtsa.gov/DOT/NHTSA/NVS/Crashworthiness/Vehicle%20Aggressivity%20and%20Fleet%20Compatibility%20Research/810863.pdf>.

⁶ NHTSA. “Investigation of Opportunities for Lightweight Vehicles Using Advanced Plastics and Composites” (DOT HS 811 692), 2012; <http://www.nhtsa.gov/DOT/NHTSA/NVS/Crashworthiness/Plastics/811692.pdf>

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<https://www.americanchemistry.com/> The American Chemistry Council (ACC) represents the leading companies engaged in the business of chemistry. ACC members apply the science of chemistry to make innovative products and services that make people’s lives better, healthier and safer. ACC is committed to improved environmental, health and safety performance through Responsible Care®, common sense advocacy designed to address major public policy issues, and health and environmental research and product testing. The business of chemistry is an \$801 billion enterprise and a key element of the nation’s economy. It is the nation’s largest exporter, accounting for 14 percent of all U.S. exports. Chemistry companies are among the largest investors in research and development. Safety and security have always been primary concerns of ACC members, and they have intensified their efforts, working closely with government agencies to improve security and to defend against any threat to the nation’s critical infrastructure.



FRED UPTON, MICHIGAN
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FOURTEENTH CONGRESS
Congress of the United States
House of Representatives
COMMITTEE ON ENERGY AND COMMERCE
2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6115
Majority (202) 225-2927
Minority (202) 225-3641
October 12, 2016

Ms. Janet McCabe
Acting Assistant Administrator
for the Office of Air and Radiation
Environmental Protection Agency
1200 Pennsylvania Avenue N.W.
Washington, DC 20004

Dear Ms. McCabe,

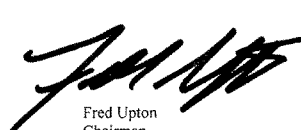
Thank you for appearing before the Subcommittee on Commerce, Manufacturing, and Trade and the Subcommittee on Energy and Power joint hearing entitled "Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles."

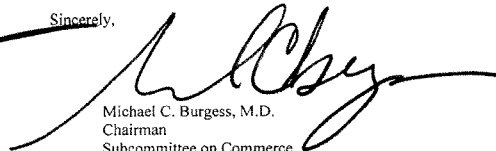
Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions by the close of business on October 26, 2016. Your responses should be mailed to Giulia Giannangeli, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Giulia.Giannangeli@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittees.

Sincerely,


Fred Upton
Chairman


Michael C. Burgess, M.D.
Chairman
Subcommittee on Commerce,
Manufacturing, and Trade

cc: The Honorable Jan Schakowsky, Ranking Member, Subcommittee on Commerce, Manufacturing, and Trade

cc: The Honorable Bobby Rush, Ranking Member, Subcommittee on Energy and Power

Attachment

FRED UPTON, MICHIGAN
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FOURTEENTH CONGRESS
Congress of the United States
House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6115

Majority (202) 225-2927
Minority (202) 225-3641

October 12, 2016

Mr. Paul Hemmersbaugh
Chief Counsel
National Highway Traffic Safety Administration
1200 New Jersey Avenue, S.E.
Washington, DC 20590

Dear Mr. Hemmersbaugh,


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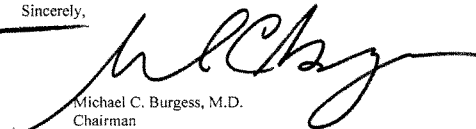
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Sincerely,



Fred Upton
Chairman



Michael C. Burgess, M.D.
Chairman
Subcommittee on Commerce,
Manufacturing, and Trade

cc: The Honorable Jan Schakowsky, Ranking Member, Subcommittee on Commerce, Manufacturing,
and Trade
cc: The Honorable Bobby Rush, Ranking Member, Subcommittee on Energy and Power

Attachment

Additional Questions for the Record
Janet McCabe and Paul Hemmersbaugh Testimony, September 22, 2016

Combined EPA and NHTSA Responses

The Honorable Michael C. Burgess M.D.

1. In your written statement and oral testimony, you mentioned how the "footprint" standards preserve consumer choice and individualize the standards. However, automakers will be required to make significant improvements to the fuel economy of all vehicles, irrespective of footprint. This will impact the types of engines available within a particular vehicle class, the materials used to construct the vehicle (e.g. aluminum and other lighter-weight material) and the fuel-saving technology that will come with the vehicle (e.g. start-stop technology).
 - A. Please explain how NHTSA and EPA assessed the extent to which consumer choice will be impacted with respect to the performance capabilities and vehicle features within a given vehicle footprint.
 - A. Is there anything besides the "footprint standards" that preserve consumer choice?
 - B. For example, what (if anything) did EPA and NHTSA do to ensure that consumers will still be able to purchase high-performance vehicles with large towing capacity, should they or their small business need to do so?
 - C. Similarly, were the agencies concerned that consumers may be forced to purchase vehicles with certain fuel saving technologies that don't fit their needs, and if so, how did they address that concern? Have you studied whether entry point vehicles will be disproportionately impacted?

EPA Response

In designing the 2012-2025 GHG standards, in coordination with NHTSA, EPA carefully considered the impact the standards can have on vehicle utility and consumer choice so that when automotive companies comply with the standards, they have the ability to maintain vehicle utility and consumer choice. EPA and NHTSA decided to use vehicle "footprint" as the attribute to determine the GHG standards for a given automotive manufacturer's fleet (the standard being the production-weighted average of the footprint-based targets for each vehicle produced). The standards vary by footprint such that larger vehicles have higher GHG and lower fuel economy targets than smaller vehicles. The program is "self-adjusting" in that if a manufacturer sells a larger mix of vehicles, then its overall fleet wide standard will be less stringent than if it sells a smaller mix of vehicles.

In addition to footprint-based standards, EPA considered many other provisions of the rule, and

the data and analysis by which the standards were developed, to work together to preserve consumer choice and vehicle affordability. These provisions include:

- The establishment of separate passenger car footprint-based standards and light-truck footprint-based standards;
- The establishment of performance-based standards (*i.e.*, not mandating use of any particular technology) that allow the auto companies to decide what technologies work best for their customers to achieve the standards;
- The establishment of a GHG emissions averaging, banking, and trading program;
- Using analytical methods and data to ensure the standards themselves are predicated on no loss in vehicle performance;
- Flexible credit generation provisions including generation of CO₂ credits from improvements in air conditioning systems and off-cycle credits, and the trading of credits for over-compliance with nitrous oxide, methane, and CO₂ credits;
- The specific shape of the passenger car and light-truck curves, which were carefully designed to represent approximately equal levels of technical challenge for each individual footprint value along the footprint standard curves;
- A change to the shape of the light-truck footprint standard curve beginning in model year 2017 to more accurately recognize the unique characteristics of high performance pickup trucks, including the need for those vehicles to perform significant towing and maintain payload capabilities;
- Providing very long lead-times for the development and deployment of technologies, up to 13 years for the most stringent 2025 standards, which with the use of the emissions averaging, banking and trading program can be extended to 18 years if needed.

These program elements and considerations in the establishment of the stringency of the 2012-2025 GHG standards provide the automotive companies with a wide range of tools to ensure that they can continue to design and sell the types of products with the utility and capability that their customers want.

With regard to consumer choice within a given vehicle footprint, a manufacturer is not required to meet the exact footprint-based CO₂/fuel economy target of any particular vehicle; rather, the manufacturer has flexibility to meet the standards on a fleet-wide average basis. Thus, within a given footprint, a manufacturer may choose to produce vehicles that have GHG emissions that are higher or lower than the given footprint-based target, and the program provides a wide range of flexibilities to achieve compliance, such as averaging and opportunities for credit transfers and credit trading. Similarly, with regard to high-performance or large towing capacity, a manufacturer is not obligated to meet the exact footprint-based CO₂/fuel economy target for those particular vehicles, but has the flexibility to meet the standards on a fleet-wide average basis. Based on EPA's reports of manufacturer's performance in meeting the standards so far, for the first four years of the program (model years 2012-2015), the industry overall has outperformed the standards each year, and this has occurred during a time when vehicles sales have also increased in each of these years. This is an indication that it is possible for consumers to purchase the vehicles that meet their needs while achieving significant GHG reductions/fuel economy improvements, and that automakers

have found ways to satisfy their customers' needs in ways that still enable them to not only meet, but beat, the standards.

With respect to the last question regarding entry-point (lower-priced) vehicles and disproportionate impacts, EPA carefully considered the issue of vehicle affordability and impacts on lower-income consumers, both in the 2012 final rule establishing the 2017-2025 standards, and in the Draft Technical Assessment Report (TAR) published this past July. In the Draft TAR, the agencies discussed this issue (see Chapter 6.5.4), and found that in model year 2015 nearly the same number of low-priced vehicle models (that is, those with a manufacturer's suggested retail price of less than \$15,000) were sold as in 2001-2009 annually. Thus, to date, it appears that manufacturers have been able to preserve the number of offerings in this segment, likely due at least in part to all of the program design elements and flexibilities available to automotive manufacturers as described above. The agencies further found that, while prices of these entry-point vehicles have risen somewhat from 2001-2015, the content of some vehicles in this segment has also increased (e.g., Bluetooth, audio controls), which likely has contributed to any price increases.

NHTSA Response

RESPONSE to 1.A:

NHTSA's Corporate Average Fuel Economy (CAFE) standards allow manufacturers to choose where and how they make improvements. Nothing in the program prevents manufacturers from producing some vehicles with fuel economy that falls well below their footprint target, as long as the difference is made up by another vehicle or vehicles above their targets.

When NHTSA sets standards, it accounts for consumer choice within particular segments by considering technology in vehicle classes only where it is appropriate to do so. For example, high compression ratio engines, plug-in hybrids, and some "strong" hybrid technologies may not be practical for full-size pickups due to the ways they are used by consumers. In addition, among other things, NHTSA's model incorporates phase-in caps tailored to assumptions about consumer purchasing behavior, and it endeavors to keep performance constant as technology is applied. NHTSA's modeling also carefully considers the anticipated pace of vehicle redesigns, which is typically more widely-spaced for full-size pickups and some performance cars than for many passenger cars. NHTSA seeks to ensure that the CAFE modeling is as realistic as possible. By modeling a compliance path for industry that incorporates factors like those mentioned above, the setting of maximum feasible standards is unlikely to require manufacturers to change the vehicles they sell in ways that consumers will reject. Manufacturers have substantial flexibility to decide where and how to make their improvements.

RESPONSE to 1.B:

Unlike vehicle safety standards or EPA exhaust emissions standards, CAFE standards apply to average fuel economy levels, not per-vehicle fuel economy levels. In addition, the Energy

Independence and Security Act of 2007 (EISA) expanded flexibilities already available under the Energy Policy and Conservation Act of 1975 (EPCA), allowing CAFE credits to be transferred between fleets and traded between manufacturers. The long-standing averaging-based approach provided by EPCA and the expanded flexibilities introduced by EISA together allow manufacturers to balance compliance obligations and provide a wide range of vehicles while ensuring that their fleet, on average, complies with the program, thereby preserving consumer choice. NHTSA sets standards accounting for a wide range of vehicles offered by manufacturers with an understanding that not all technologies will be uniformly adopted by consumers.

RESPONSE to 1.C:

NHTSA's CAFE standards are based on vehicle footprint, resulting in larger vehicles having lower fuel economy targets than smaller vehicles. Lower footprint targets for larger, high-performance vehicles acknowledge that fuel economy improvements can be made without requiring technology that would reduce the utility of those vehicles. Further, the agencies selected the truck curve (e.g., steeper curve slopes and longer cut points) so that manufacturers should be better able to avoid downgrading the performance or utility of the largest vehicles while still having an incentive to improve their fuel economy. Additionally, NHTSA's analysis and methodology mentioned above helps to account for consumer preferences for vehicle attributes other than fuel economy. Regarding vehicles with large towing (and/or payload) capacity, such as may be needed by some small businesses, heavy-duty pickups and vans are regulated separately under standards defined in terms of a "work factor," which explicitly accounts for vehicle characteristics such as vehicle payload, towing capacity, and four-wheel drive.

RESPONSE to 1.D:

NHTSA's analysis recognizes that not all fuel economy technologies can or will be incorporated uniformly across manufacturer fleets. Manufacturers can choose where and how to improve the average fuel economy of their fleets based on the needs of consumers. Manufacturers may choose to concentrate their efforts in certain segments or to spread improvements across greater portions of their fleets. NHTSA does not dictate any specific compliance path. As a result, consumers will be able to buy any vehicle they choose that fits their needs. Affordability of entry point vehicles is a topic that NHTSA will look at more closely in the upcoming notice of proposed rulemaking (NPRM) as part of our assessment of economic practicability, which is one of the factors that the Agency must consider in setting maximum feasible CAFE standards.

2. [Question to EPA only] In light of the fact that a manufacturer's fleet-average GHG emissions are limited by these standards, does the California ZEV mandate achieve any additional benefit in terms of GHG reductions from the light duty fleet?

EPA Response

While the fleet-average GHG emissions standards establish minimum standards, they do not limit the ability of manufacturers to achieve further reductions, and any manufacturer that does

will generate credits that can be used or traded. The EPA GHG standards are performance standards, and do not require any specific technology. That is not the case with the California ZEV mandate, which thus provides an incentive for automotive companies to invest in more advanced technologies. EPA's assessment for the Draft TAR indicates that were it not for the California ZEV program, most auto companies would not produce as many all electric and plug-in hybrid electric vehicles in the 2025 time frame. California adopted its ZEV program to address multiple pollutants, including GHGs, and the reductions in pollution from ZEVs in California help address the significant air quality challenges in that state. ZEVs sold in California and other states will help a manufacturer to meet (or exceed) the EPA GHG standards.

3. In your opinion, are advances in conventional internal combustion engine technology (i.e., non-hybrid) sufficient by themselves to achieve the current standards for model year 2025? If not, could you please provide your estimates for how much of each of the following technologies (as defined in the TAR) will be required to achieve the current standards for model year 2025: (a) mild hybrid; (b) full hybrid; (c) plug-in hybrid electric vehicle; and (d) electric vehicle.

Joint Response

The agencies show in the Draft TAR that the 2022-2025 standards can be achieved largely through the use of advanced gasoline vehicle technologies with modest penetrations of strong hybrids and very low penetrations of full electrification (like plug-in hybrid electric vehicles, and all electric vehicles). The agencies' analyses in the Draft TAR present, respectively, different feasible, cost-effective compliance paths for manufacturers. Since the standards are performance-based, each manufacturer is free to choose the suite of technologies that it believes are best for its vehicles to meet the standards. In other words, these pathways are not an assumption of the minimum amounts of these technologies manufacturers will need to deploy to meet the standards.

Additional EPA Response

In EPA's estimates of a low-cost pathway by which a manufacturer could achieve the MY2025 standards, we projected fleet penetrations of about 18% mild hybrids, less than 3 percent full hybrids, less than 2 percent plug-in hybrid electric vehicles, and less than 3 percent electric vehicles.

Additional NHTSA Response

As Table ES-3 of the Draft Technical Assessment Report (TAR) shows, based on the assumptions used at that time, NHTSA's primary analysis for the TAR found that fleetwide compliance with the augural MY 2025 CAFE levels could generally be achieved with 14% mild hybrids; 14% full hybrids; less than 1% plug-in hybrid electric vehicles; and less than 2% electric vehicles. However, manufacturers may rely on different compliance strategies than those assumed by NHTSA in the TAR

4. According to Table ES-3 of the TAR, EPA's compliance pathway for meeting the MY2025 GHG standards envisions that 44% of vehicles would use higher compression ratio, naturally aspirated gasoline engines. If a manufacturer does not have that type of engine in any of its vehicles today, what steps would it have to take in order to integrate that type of engine in its product line, and how long would it take for it to reach a 44% penetration rate?

EPA Response

The use of higher compression ratio, naturally aspirated gasoline engines (Atkinson cycle engines) is just one technology among the many suites of potential technology pathways to compliance. EPA analyzed nine additional potential technology pathways by which the industry could comply with the 2022-2025 standards, including a pathway with only a 10% penetration of higher compression ratio, naturally aspirated gasoline engines (see Chapter 12.1.2 of the Draft TAR).

The steps required to implement an Atkinson cycle engine are relatively modest compared to implementing some of the other engine technologies being developed and implemented. The technology requires an intake valve cam phaser with a high range of control authority and increased geometric compression ratio (see the Draft TAR, Chapter 5.2.2.9, which describes the technology and provides examples of current implementations). The requisite cam phaser hardware is readily available to any manufacturer, and the technology is not restricted by patent protections. As discussed in the Draft TAR, it is EPA's assessment that this technology can be incorporated by any manufacturer and that there is sufficient time between now and the model year 2022 to 2025 that this technology can represent a high penetration rate of a company's products. We note that EPA's vehicle emissions rules have always incorporated the lead time necessary for the industry to comply. In this case, the standards were set in 2012 with an especially long lead time – more than 10 years – and the vehicle manufacturers have been developing a range of technologies for several years, as discussed in detail in the Draft TAR.

Several manufacturers – including Mazda, Hyundai, and Toyota -- are implementing forms of Atkinson cycle engine technology today, and other automakers have told EPA confidentially that they are planning to follow this path for some of their engines.

It is important to note that EPA's projected technology penetrations are meant to illustrate one of many possible technology pathways to achieve compliance with the MY2025 GHG standards. The rules do not mandate the use of any particular form of technology. Put another way, the standards are performance-based and thus manufacturers are free to select among the suite of technologies they best believe is right for their vehicles to achieve compliance. As we've seen in recent years with the rapid advances in a wide range of GHG-reduction technologies, ongoing innovation can be expected to result in further improvements to existing technologies and the emergence of others.

NHTSA Response

This question is specifically about EPA's analysis, and NHTSA defers to EPA to answer for its analysis. For NHTSA's analysis, NHTSA assumes that manufacturers that have already taken steps in other directions (in particular, toward downsized turbocharged engines) would continue in those directions rather than pursuing high compression ratio engines.

5. In the TAR, the EPA states that in its modeling, "the California Zero Emission Vehicles (ZEV) program is considered in the reference case fleet; therefore, 3.5% of the fleet is projected to be full EV or PHEV in the 2022-2025 timeframe due to the ZEV program and the adoption of that program by nine additional states." Since a significant portion of the required GHG reductions will be met through manufacturing electric-drive vehicles for the ZEV mandate, shouldn't EPA have considered those costs in its assessment of the costs of the regulation? If EPA had considered the costs of producing electric-drive vehicles, what impact would that have had on the cost estimates in the TAR?

EPA Response

The California ZEV program is an existing state requirement that has been adopted by California, as well as several other states across the country – it is not a federal program. Therefore, consistent with guidance issued by the Office of Management and Budget, EPA included vehicles that are needed to comply with the ZEV program as part of our reference fleet in assessing the MY2022-2025 GHG standards (See OMB Circular A-4, Section E.2, "Developing a Baseline"). The Draft TAR does not include an assessment of the benefits or the costs of the ZEV program in the assessment of 2022-2025 National Program standards. However, any ZEV vehicles sold in California and other states will help a manufacturer in meeting the EPA GHG standards.

6. As was noted in the hearing, one of the goals of the so-called "One National Program" is to enable automakers to build a single fleet of vehicles that could be sold anywhere in the country. Can EPA/NHTSA please explain whether the modeling that each individually performed for the Draft TAR results in a single fleet for each manufacturer that simultaneously complies with the EPA greenhouse gas regulation, the NHTSA fuel economy regulation, and the State of California's zero emission vehicle regulation?

EPA Response

EPA's detailed modeling presented in the Draft TAR shows that each manufacturer has a compliance pathway for its projected MY 2025 GHG standards (see, for example, Table 12-4 and Tables 12-29 through 12-40 of the Draft TAR). In addition, EPA's assessment incorporates projected compliance with the ZEV program through our reference case (i.e. the fleet as it would exist in MYs 2022-2025 without complying with the GHG emission standards for those model years), as described in our response to Questions 2 and 5, and any ZEV-

compliant vehicles do count towards the manufacturers' GHG compliance. EPA did not explicitly model the CAFE program.

NHTSA Response

EPCA, as amended by EISA in 2007, establishes specific and clear direction regarding many CAFE provisions (e.g., attribute-based standards expressed as mathematical functions, separate standards for cars and trucks, separate compliance for domestic and imported passenger car fleets, caps on credit transfers and trades), and requires NHTSA to set each CAFE standard separately at the maximum feasible level in each model year. The Clean Air Act provides no corresponding direction.

Given these different statutory frameworks, NHTSA and EPA have attempted to harmonize requirements from model year 2012 forward. While manufacturers may choose to take advantage of EPA-specific provisions (e.g., credit for reducing emissions of high global warming potential refrigerants), the agencies have designed the standards so that it is possible for a fleet that complies with CAFE standards to comply also with greenhouse gas (GHG) standards. If manufacturers are also complying with the zero emission vehicle (ZEV) standard, the vehicles that they build in order to meet that standard would be counted toward CAFE compliance as part of their overall U.S. fleet. That said, NHTSA models compliance in accordance with its own statutory authority, and not with EPA's GHG standards or with CARB's ZEV program.

7. [Question to EPA only] You describe your next step in the midterm evaluation process as a proposed determination. First, when do you expect this step to occur? Second, when do you anticipate responding to public comment on the Draft TAR? Lastly, can you assure this Committee that the EPA isn't attempting to issue a proposed determination this year or before the next Administration is sworn into office?

EPA Response

On November 30, 2016, Administrator McCarthy signed the Proposed Determination referred to in this question, and has opened a 30-day public comment period. The Proposed Determination is based on years of extensive analysis that demonstrates that automakers are well on track to meeting the model year 2022-2025 standards through a wide range of technology pathways that are attractive to consumers.

As part of the Proposed Determination, EPA has fully considered and responded to the public comments we received on the Draft TAR this year as well as updated information.

EPA's detailed technical analyses are laid out in a comprehensive Technical Support Document. These analyses have led to a very strong proposed technical conclusion that the standards established in 2012 for the 2022-2025 model years continue to be appropriate, without change. EPA will consider any additional data and information we receive during this

additional public comment period, as part of the Administrator's Final Determination.

The Administrator views the factual record as clear and extensive, benefitting from significant public input from the automotive industry and many other stakeholders. At this point, the Administrator has a strong record that allows her to move forward with her proposed determination without delay. Given the benefits of regulatory certainty and the long lead time needed in the automobile manufacturing business, the Administrator will expeditiously consider all comments and will reach a Final Determination as the facts warrant.

Finally, it is important to recognize that the Proposed Determination is not a standard-setting rule; in fact, it is not a rule at all, and proposes absolutely no changes to the existing standards. Rather, it is a comprehensive reassessment of the state of technology and technology costs in the auto manufacturing sector and of trends that can be clearly identified today, and how this state of affairs relates to the effectiveness and appropriateness of the current standards

5. [Question to NHTSA only] As was noted in the hearing, one of the goals of the so-called "One National Program" is to enable automakers to build a single fleet of vehicles that could be sold anywhere in the country. Can NHTSA please explain whether the modeling that it individually performed for the Draft TAR results in a single fleet for each manufacturer that simultaneously complies with the EPA greenhouse gas regulation, the NHTSA fuel economy regulation, and the State of California's zero emission vehicle regulation?

NHTSA Response

EPCA, as amended by EISA in 2007, establishes specific and clear direction regarding many CAFE provisions (e.g., attribute-based standards expressed as mathematical functions, separate standards for cars and trucks, separate compliance for domestic and imported passenger car fleets, caps on credit transfers and trades), and requires NHTSA to set each CAFE standard separately at the maximum feasible level in each model year. The Clean Air Act provides no corresponding direction.

Given these different statutory frameworks, NHTSA and EPA have attempted to harmonize requirements from model year 2012 forward. While manufacturers may choose to take advantage of EPA-specific provisions (e.g., credit for reducing emissions of high global warming potential refrigerants), the Agencies have designed the standards so that it is possible for a fleet that complies with CAFE standards to comply also with greenhouse gas (GHG) standards. If manufacturers are also complying with the zero emission vehicle (ZEV) standard, the vehicles that they build in order to meet that standard would be counted toward CAFE compliance as part of their overall U.S. fleet. That said, NHTSA models compliance in accordance with its own statutory authority, and not with EPA's GHG standards or with CARB's ZEV program.

8. [Question to EPA only] Your agency modeled that the total plug-in electric vehicle market-share for 2025 would need to be over 4% in the United States to meet the State of California zero emission vehicle program requirements, approximately 6.5 times higher than its state in 2015 (0.66%, hybridcars.com). What enabling complimentary policies

from the federal government do you see as necessary to bring this modeled increase to fruition?

EPA Response

The Draft TAR analysis projects about 4% electric vehicles (EV) and plug-in hybrid electric vehicles (PHEV) in the 2025 fleet. Of this 4%, only about 1% was the increment driven by the GHG standards. The remaining vehicles were included in our reference fleet – either EV/PHEVs already in the MY2014 baseline fleet projected out to 2025 (~190,000 vehicles), or required by the California ZEV program (~420,000 vehicles). See Tables 4.27 and 4.28 of the Draft TAR. EPA is aware that California and the other states that have adopted the ZEV program have put in place many complementary policies to support the growth of EV and PHEVs in their states to support their adoption of the ZEV program.

EPA in general is supportive of and engaged in well-designed complementary federal government policies that will support the growth of the electrified vehicle market, as these technologies will likely be needed in order to meet the longer-term need to address GHG emissions from the transportation sector. EPA does not regard such programs as critical for the very small number of these vehicles (about 1%) projected in the Draft TAR analysis for compliance with the 2025 GHG standards.

10. [Question to NHTSA only] In your opening statement you described the levels of strong hybrids that NHTSA models as being necessary for compliance in 2025 as "modest". Can you please explain your reasoning given that the level of strong hybrids modeled was 14% (Draft TAR at ES- I 0), approximately five times the present level of the market (approximately 3%)?

NHTSA Response

The standards examined are for model year (MY) 2025. NHTSA believes that 14% is a modest level of strong hybrids for a model year that is almost a decade in the future. It bears repeating that it is up to manufacturers to determine how they choose to comply.

9. Both EPA and NHTSA modeled an average vehicle cost increase of \$680 to \$1,620 for manufacturers to bring vehicles into compliance with the 2025 regulations relative to the 2021 regulations. What is your total estimated cost increase for model year 2025 vehicles relative to 2016 model year vehicles for all regulations under your purview, including the 2017-2021 greenhouse gas and fuel economy regulations, "Tier 3" tailpipe emission regulation, and all applicable and reasonably anticipated safety regulations? Given these anticipated increases in vehicle price, what do you estimate the loss in vehicle sales related to these regulations to be? What are the resulting automotive and related industry job losses anticipated?

EPA Response

In the Draft TAR, EPA estimated an average per-vehicle cost of \$1,565 for the industry to go from the MY2014 baseline fleet level to the MY2025 standards (see Table 12.44 of the Draft TAR). Since the Tier 3 tailpipe criteria pollutant emissions standards are already in effect, these regulations, as well as existing safety regulations, were treated as part of our reference fleet analysis. The Tier 3 light-duty vehicle emissions and fuel standards final rule in 2014 estimated that the cost of that program would be \$72 per vehicle by 2025, when the program is fully phased in.

As explained in the Draft TAR, to date consumer response to vehicles subject to the GHG standards is positive. Our analysis in the Draft TAR also continues to project that the fuel savings over time will far exceed the up-front vehicle costs, which we believe should mitigate any potential impacts on vehicle sales. While there may be some net effect of the standards on jobs (for example, jobs spurred by increased auto industry and supplier expenditures on technologies to meet the standards or jobs lost because higher priced vehicles may lead to reduced sales) we believe any such effects are likely to be small compared to the large effects of the macroeconomic forces shaping the auto industry today.

NHTSA Response

Tier 3 is an EPA regulation, and not under NHTSA's jurisdiction, so NHTSA does not account for the costs of Tier 3 compliance in NHTSA rulemakings. Safety standards and fuel economy regulations can increase the cost of producing vehicles by requiring manufacturers and suppliers to internalize the otherwise-external costs to society of vehicle crashes, fuel use, and environmental impacts that safety standards and fuel economy regulations could prevent or mitigate. However, many long-term economic benefits still exist for consumers that are not accounted for in vehicle price, such as reduced fuel costs over the lifetime of a vehicle resulting from fuel economy improvements. Further, NHTSA does not believe that sales and job losses are inevitable as a result of increases in vehicle production costs. Also, given that manufacturers use safety and fuel economy as selling points, manufacturers would reasonably be expected to construct sales campaigns that explain to consumers how the benefits of these improvements outweigh any cost increases that manufacturers choose to pass on to consumers.

10. Both EPA and NHTSA developed two different analyses of the technologies required to meet the 2025 greenhouse gas and fuel economy regulations. You purport that these separate analyses show how manufacturers have many paths which could be chosen for compliance. Please explain how two completely different technology pathways both result in the "lowest" cost of compliance for a manufacturer and the American consumer?

Joint Response

The GHG and CAFE standards are performance standards, and manufacturers are free to choose exactly how they wish to comply. The agencies know that manufacturers will not choose

exactly the paths that our respective analyses reflect. The GHG and CAFE analyses shown in the Executive Summary for the Draft TAR are just two of many potential pathways for meeting the future standards. For example, in Section 12.1.2 EPA shows 9 other technology pathways by which the industry could comply with the MY2022-2025 standards. The separate analyses make our results more robust and credible.

The agencies' independent analyses complement one another and reach similar conclusions, including that advanced gasoline vehicle technologies will continue to be the predominant compliance choice, with modest levels of strong hybridization and very low levels of full electrification (plug-in vehicles) needed to meet the standards. It is important to note that the agencies' projected technology penetrations are meant to illustrate several of the many possible cost-effective technology pathways to achieve compliance with the MY2022-2025 GHG standards. The standards are performance-based and thus manufacturers are free to select among the suite of technologies they believe is best for their vehicles to achieve compliance.

Both the NHTSA and EPA models are based on cost optimization, and some of the differences in analysis are attributed to differences in each agency's modeling inputs or methods, many of which are due to differences in the agencies' respective statutes. As one example, only NHTSA's analysis considers EPCA/EISA's provisions regarding civil penalties and limitations on credit transfers. Again, the Agencies recognize that manufacturers may not choose exactly the path that we have modeled. Since CAFE and GHG standards are performance standards and not technology mandates, manufacturers are free to choose which technologies to apply to which vehicles in order to meet consumer demand and the standards at the same time, i.e., they have many potential pathways.

11. Auto manufacturers claim to have identified a number of technical issues with the technology benefit modeling described by the Draft TAR. What is your plan to address these concerns? Have your agencies verified these models against actual vehicles other than those the models were calibrated to directly? If so, what were the results?

EPA Response

EPA appreciates the public comments regarding our modeling in the Draft TAR; we have carefully considered the public comments on our technology analysis, and have updated our assessment in several areas in response to comments, as described in detail in the Proposed Determination. With respect to the modeling performed for the Draft TAR, EPA verified our models with actual vehicles and we use actual engine and transmission maps along with actual measured vehicle data in our modeling. This is described on our vehicle simulation model website (<https://www3.epa.gov/otaq/climate/alpha.htm>) and detailed in 16 recent peer-reviewed technical papers published by the Society of Automotive Engineers (SAE) describing our vehicle, engine, & transmission benchmarking, and the development and use of EPA's full vehicle simulation model. As summarized in SAE paper 2016-01-0910, EPA has tested over 25 different types of conventional and hybrid vehicles/engines across a wide range of powertrains and segments. The vehicles/engines were chosen based on our need to evaluate key technologies like naturally aspirated and boosted (turbocharged) I4/I6/V6 engines, using 5, 6 and

8+ speed automatic and dual-clutch transmissions, as well as continuously variable transmissions.

NHTSA Response

NHTSA is currently reviewing and will address comments regarding inputs (e.g., “engine maps” and transmission characteristics) to the full vehicle simulation work used to estimate the extent to which various combinations of fuel-saving technologies could reduce fuel consumption for different types of vehicles.

12. Fuel prices have changed significantly since 2012 when the 2022-2025 rules were first established. Can you explain why these changes in fuel prices have had minimal impact on your modeling results?

Joint Response

These changes in fuel prices are fully reflected in the Draft TAR analysis, and influence the initial conclusions stated in the Draft TAR. In the Draft TAR, the agencies used available data from the Energy Information Administration’s Annual Energy Outlook (AEO) 2015. The AEO2016 Reference case was first released on May 17, 2016, too late to be included in the Draft TAR.

The agencies assessed a range of fuel price scenarios included in the AEO2015’s reference case, as well as its high fuel price scenario and low fuel price scenario. The agencies also assessed the three corresponding vehicle fleet mix and production volumes associated with each fuel prices scenario. See Table ES-1 of the Draft TAR. The agencies show that these three fuel price scenarios lead to differing projections about the auto industry’s achieved CAFE and GHG targets by MY2025, of 47.7 mpg/169 grams/mile (g/mi) to 46.3/175 g/mi to 45.7/178 g/mi under the high, reference, and low fuel price scenarios, respectively.

Additional EPA Response:

EPA further assessed the costs of meeting those fleet-wide standards and the associated projected technology penetrations (see Tables 12.48, 12.49, and 12.50 of the Draft TAR). As shown, each of the fuel price scenarios resulted in average per-vehicle costs and projected technology penetrations that show cost-effective pathways to compliance with the MY2025 standards, largely through production of advanced gasoline vehicles.

13. I am concerned that there is very little analysis of consumer acceptance in the Draft TAR. What is your plan to address this issue in the limited time remaining? How are you going to ensure the affordability of these vehicles for the American consumer?

Joint Response

Chapter 6 of the Draft TAR assesses consumer acceptance of the vehicle technologies expected to be used to meet the MY2022-2025 standards, and finds that to date consumer response to vehicles subject to the standards is positive. Many issues related to affordability were assessed, including effects on low-income households, effects on the used vehicle market, effects on access to credits, and the effects on low-priced cars. That chapter also reflects an exhaustive search of available literature on the issue. As the Draft TAR concludes, while it is challenging to separate the effects of the standards from other market changes, if the standards have affected vehicle affordability, those effects do not appear to have been large enough to be obvious in our considerations of the data.

Additional EPA Response:

There were many public comments on issues of consumers and vehicle affordability from automakers, dealers, consumer groups, environmental NGOs, and others that we carefully assessed and that helped inform our Proposed Determination. EPA has responded to these public comments as part of its Proposed Determination.

Additional NHTSA Response

NHTSA intends to include a discussion and analysis of affordability issues in its upcoming NPRM.

14. During the hearing, many noted how footprint-based standards address shifts in vehicle size and therefore implicitly address manufacturer concerns regarding customers' changing vehicle size preferences. Do footprint-based standards address customer powertrain selection within the same vehicle? Do footprint-based standards address market shifts from cars to similarly sized crossover vehicles that must meet the same standards?

Joint Response

The standards accommodate consumer choice – consumers can still choose vehicles with bigger engines, or choose crossover vehicles rather than cars. As consumers make those choices, it is up to manufacturers to choose how to meet the standards. If some vehicles sold fall short of their targets, manufacturers must decide what other vehicles to sell in order to meet their overall average standard. That has always been the nature of the corporate average fuel economy and GHG vehicle standards.

With regard to consumer powertrain selection within a given vehicle footprint, a manufacturer is not required to meet the exact footprint-based CO₂/fuel economy target of any particular vehicle; rather, the manufacturer meets the standards on a fleet-wide average basis. Thus, within a given footprint, a manufacturer may choose to produce vehicles that are higher or lower than the given footprint-based target, and the program provides a wide range of

flexibilities to achieve compliance, such as averaging and opportunities for credit transfers and credit trading. Specifically, with respect to customer power train selection within the same vehicle, please see the response to Question 1 above, which includes a detailed description of the program elements that provide the automotive company with significant flexibilities for how they can comply with the program, as ultimately it is up to each individual automotive company to decide what powertrain options to offer for sale for any given vehicle. It is important to note that when consumers shift from cars to similarly sized crossover vehicles, that shift may change manufacturers' overall GHG/CAFE standards. NHTSA and EPA have separate standards for cars and trucks, and many crossover vehicles (e.g., especially four-wheel drive crossovers) are defined as trucks, and therefore subject to more lenient targets than similarly-sized cars.

15. **[Question to EPA only]** During the investigation of VW's emissions "cheat devices," EPA stated that the defeat device results in on-road emissions of nitrogen oxides (NOx) that are 10 to 40 times higher than permitted by regulation. Please provide a detailed explanation or description of any assessments EPA has conducted to evaluate the real-world effects of these emissions. In addition, please respond to the following question:

- What is the difference between the expected U.S. domestic NOx emissions from these vehicles without the defeat device and with the device (i.e., how many more emissions were found to have been emitted from these cars than were expected without the device). Please provide all documentation regarding EPA's analyses.

EPA Response

EPA cannot comment at this time due to the ongoing investigation.

16. Given the amount of subjective modeling in the TAR, should fines and penalties be adjusted where TAR assumptions don't materialize?

Joint Response:

There are many aspects of our modeling that are necessarily based on projections, for example, projections of future fuel prices to assess potential fuel savings and projections of the future vehicle fleet mix to assess potential fleet-wide CO₂ targets. While these projections are important for assessing potential future impacts of the standards, it is important to remember that the standards are performance-based, so manufacturers may choose which technology path makes the most sense for their compliance strategies. More basically, a manufacturer's actual standards are based on the mix of vehicles they produce in a given model year. Thus, whether or not the projections made in the Draft TAR materialize, manufacturers' compliance is based on their actual vehicle production. The most recent EPA Manufacturer Performance Report for MY 2015 documents that manufacturers have been exceeding the GHG standards for four years in a row.

Additional NHTSA Response

NHTSA does not have authority to amend the civil penalty amount beyond the inflation adjustment mandated by the 2015 Inflation Adjustment Act, except as provided in 49 U.S.C. 32912(c). NHTSA's statutory authority requires the Agency to set CAFE standards at the maximum feasible level, and to amend them if they are not maximum feasible. These decisions are informed by information that manufacturers provide to the Agency.

17. What additional steps do you plan to take to further align the varying standards?

EPA Response

Please see EPA response to Representative Guthrie below.

[NHTSA Burgess Q14] What additional steps does NHTSA plan to take to further align with varying standards?

NHTSA Response

There is a petition for rulemaking currently before the Agency asking it to consider granting additional CAFE credits by regulation, which NHTSA is actively considering. The upcoming rulemaking to set CAFE standards for MYs 2022 and beyond will also consider issues such as programmatic flexibilities and what levels of stringency would be maximum feasible for those model years

The Honorable John Shimkus

1. You noted in your testimony that innovation is resulting in over 100 Car, SUV, and Pickup versions on the market today that already meet 2020 or later standards. I'd like to see that list of 100 vehicles and I'd like to know three things:
 - A. What percentage of vehicle sales do those 100 cars, SUVs and Trucks represent?
 - B. What is the price differential versus other similarly situated cars, SUVs or trucks?
 - C. How many of the 100 also meet the EPA and NHTSA requirements by 2025?

EPA Response

As presented in Appendix C, Table 3.1 of the Technical Support Document associated with the Proposed Determination (posted at this site: <https://www.epa.gov/sites/production/files/2016->

[11/documents/420r16021.pdf](#)), EPA's analysis indicated that there are about 150 model year 2016 vehicle versions (out of a total of 1,328 versions) that already meet their respective footprint-based CO₂ target for model year 2020, which represents about 17 percent of total production; almost 60 versions already meet the 2025 targets, which represent over 3 percent of production. Although final data for model year 2017 are not yet available, it appears that this trend is continuing. EPA does not have pricing information for vehicle models.

NHTSA Response

NHTSA does not track this information because the CAFE standards are average standards. Although CAFE standards are defined in terms of footprint-based functions under which each vehicle version has a target, no single vehicle is required to meet its target, because CAFE standards apply to the average fuel economy of manufacturers' fleets of passenger cars and light trucks. Thus, specific individual vehicles do not meet or fail to meet CAFE standards.

2. Can you please explain how EPA and NHTSA considered how the increased costs of future fuel economy/GHG standards may conflict with a consumer's ability to afford various life- saving vehicle safety technologies that auto manufacturers are currently adding to vehicles? Effectively, when consumers have limited funds to purchase a new car, is EPA and NHTSA presuming that the emissions and fuel economy technology and compliance obligations take priority over other safety technologies? What other consumer needs do the agencies believe should not take priority over fuel economy (e.g. utility)?

Joint Response

EPA and NHTSA believe that the implication that consumers will have to choose between improved fuel economy and safety is a false choice, as there's no reason under our standards that consumers can't continue to choose the vehicle that has the utility, performance, safety, and other attributes that meet their needs. As explained in the Draft TAR, we have not found evidence to date that consumers have needed to compromise on any needs while reducing fuel consumption and greenhouse gas emissions. With regard to how we accounted for safety regulations in our Draft TAR analysis, the agencies assumed as part of the reference case that all currently required safety equipment is included in the vehicles.

Additional NHTSA Response Fuel economy and safety can continue to improve concurrently. New vehicles frequently have more safety features *and* get better fuel economy than prior models, and may also have more of other consumer-desired attributes like towing, hauling, or acceleration. Manufacturers strategize on pricing as they decide how to compete in different market segments. NHTSA's modeling tries to account for manufacturers' interests in maintaining or improving consumer-desired attributes like towing, hauling, and acceleration. We also account for the mass gains likely to result from compliance with upcoming safety standards in our assessment of fuel economy benefits. We are carefully considering TAR

comments on consumer needs and will respond to those comments as part of the upcoming NPRM.

The Honorable H. Morgan Griffith

1. Due to EPA's proposed requirements, truck trailer manufacturers will have to add aerodynamic equipment, with the added weight displacing freight. As trucking companies still must observe weight laws, it is only logical more tractor trailers will be needed to carry the same amount of freight.
 - A. Won't more tractor trailers on the road will worsen air quality and safety?
 - B. Is it true that NHTSA estimates that an additional 2.7 people will die annually in road deaths as a result of these regulations?

EPA Response

For clarity, this question refers to the Heavy-Duty Phase 2 GHG standards that EPA and NHTSA recently finalized (81 FR 73478, October 25, 2016). That rule is independent of the light-duty vehicle standards assessed in the Draft TAR.

In our analyses for that rule, the agencies recognized that the aerodynamic devices that we believe may be adopted to meet the Heavy-Duty Phase 2 GHG trailer standards would inherently add weight to trailers. We also recognized that for that fraction of trips for which trailer operators load trailers to the maximum legal weight, the relatively small weight of the devices could result in an increase in numbers of trips. For that analysis, we estimate that trailers “weigh out” in that way about one third of overall tractor-trailer trips, and that they “cube out” (that is, reach the maximum volume of the trailer before the weight limit is reached) for the remainder of trips.

At the same time, the rule provides an incentive to reduce the overall weight of their trailers, and the potential positive safety implications of weight reduction efforts could partially or fully offset safety concerns from added weight of aerodynamic devices. In fact, weight reduction incentivized through the Phase 2 trailer program could produce net benefits for both safety and air quality in the longer term due to the potentially greater amount of cargo that could be carried on each and the need for fewer trucks on the road.

NHTSA Response

Response to 1.A:

The Phase 2 medium- and heavy-duty fuel efficiency rulemaking assumes that trailer manufacturers will apply aerodynamic devices to their trailers, increasing the aerodynamic efficiency of the trailer, thereby using less fuel. Additionally, the rule considers that some

trailer manufacturers will incorporate lightweight components (e.g., aluminum landing gears and coupler assemblies) into their trailers. The Agencies examined this relationship in the Phase 2 medium- and heavy-duty rulemaking and concluded that the additional weight from aerodynamic fittings could be partially or fully offset by lightweighting. Therefore, both agencies agree that adding aerodynamic components will not necessarily lead to more tractor trailers on the roads.

Response to 1.B

No. The Agencies considered and analyzed the added weight from installing aerodynamic devices on trailers. A commenter to the proposal included an estimate of projected additional fatalities due to increased truck vehicle miles travelled (VMT) and the Agencies noted discrepancies in the commenter's assumptions. The Agencies concluded that integrating lightweight technologies into trailers, which is a means of compliance, could partially or fully offset the safety concerns stemming from the added weight of aerodynamic devices.

2. **[Question to EPA only]** At the Committee hearing, you justified EPA's regulation of trailers as a "self-propelled vehicle" (42 USC 7521(b)) by stating "without a trailer, a truck is not transporting goods. And so we see the trailer as an integral part of the vehicle that is covered in the Clean Air Act." Currently, the truck can't drive itself. So does the EPA take the position under the Clean Air Act that it has the authority to regulate the height, weight, and size of the driver?
3. **[Question to EPA only]** I hope you laughed at the above question. However, isn't that the same reasoning that you used as the basis for regulating trailers?

EPA Response

EPA's rationale for establishing greenhouse gas standards for trailers is more inclusive than the hearing format allowed; we are glad to provide a fuller response here. EPA's basic logic chain is as follows:

- A tractor-trailer together is unquestionably a "motor vehicle," as we explain in detail in the Heavy-Duty Phase 2 final rule. Therefore, EPA is authorized to promulgate emission standards for pollutants emitted by that motor vehicle.
- The Clean Air Act also contemplates emission standards from discrete segments of motor vehicles. See, e.g. 42 USC section 7521 (a)(6) (standards for onboard vapor recovery systems on "new light-duty vehicles"). A trailer is such a discrete component of the tractor-trailer.
- Trailer manufacturers can be required to certify (i.e. demonstrate) compliance with these standards because they meet the definition of "manufacturer" in 42 USC section 7550(1). That definition contemplates that motor vehicles can have more than one manufacturer.
- In fact, EPA's motor vehicle emission standard regulations have long provided 'delegated

assembly' provisions, where a motor vehicle is assembled by different, unrelated entities in discrete segments. These provisions (which antedate the Phase 2 regulations by decades) provide when and how certification responsibilities are allocated when a motor vehicle has multiple, unrelated manufacturers. The requirement in the phase 2 rule that trailer manufacturers certify compliance with the trailer standards is an application of these longstanding rules.

Please see 81 FR at 73512-517 (Oct. 25, 2016) for a fuller explanation.

The Honorable Brett Guthrie

Following a previous hearing on related issues, I submitted questions for the record regarding the "lack of harmonization" between the NHTSA and EPA fuel economy programs. Based on feedback I've gotten from the field, my takeaway is that we don't have "one" program in practice. The manufacturers are still regulated by two federal agencies under two programs that do not appear to be fully harmonized.

However, the Administration said in its Regulatory Announcement of August 2012 regarding the 2017-2025 requirements: "Continuing the National Program ensures that auto manufacturers can build a single fleet of U.S. vehicles that satisfy requirements of both federal programs as well as California's program." In several of the responses to my previous questions for the record, NHTSA stated that "manufacturers may build a single fleet to meet all requirements." And, "Because of the different statutory authorities, the [NHTSA and EPA] programs differ in some ways, but are structured to be harmonized such that manufacturers may build a single fleet of vehicles to meet all requirements."

1. Is there a situation where a manufacturer could meet the NHTSA requirement and not meet the EPA's requirement or vice versa?
2. Is it not automatic or "ensured" that one fleet of vehicles will comply with both programs- as the Regulatory Announcement stated?
3. Is my understanding correct that the two programs claim about the same fuel savings through 2021, NHTSA at 65.3 billion gallons and EPA at 65.6 billion gallons?
4. If the answer to number three is yes, both programs claim about the same fuel savings, then what could be the public policy benefit of a manufacturer being able to build a fleet that meets one agency's requirements but still having to pay a fine to the other program for the same fleet, as I understand can happen in practice?
5. Are your agencies aware of legislative provisions that would help correct the harmonization inconsistencies?

6. Will your agencies commit to working with Congress to enact these changes?

Joint Response

The National Program is possible because of the close relationship between reducing CO₂ tailpipe emissions and improving fuel economy. The more fuel efficient a vehicle is, the less fuel it burns to travel a given distance; the less fuel it burns, the less CO₂ is emitted in traveling that distance. Therefore, the same sets of technologies that improve fuel efficiency also at the same time reduce CO₂ emissions (note there are some technologies that reduce GHG emissions but do not improve fuel efficiency, for example, reduction of air conditioning refrigerant emissions). In this way, the National Program allows auto manufacturers to use a common set of technologies to simultaneously address both related issues of reducing CO₂ emissions and improving fuel efficiency. (See 75 FR 25327, May 7, 2010).

Going back to the first time the agencies established standards for the 2012-2016 model years, EPA and NHTSA were clear that there were some important differences in the statutory authorities (see 75 FR 25330, May 7, 2010), and that the stringency of the respective standards was in fact established to account for differences in air conditioning improvements. The agencies have worked to establish a national program subject to the differences in statutory authorities.

Additional EPA Response

One area where the statutory authorities are different between the agencies relates to potential penalties for non-compliance. The Clean Air Act allows EPA considerable discretion in assessing penalties, and, in the event of a compliance action arising out of the same facts and circumstances, EPA could consider CAFE fines when determining appropriate remedies for the EPA case.

EPA would be happy to assist in providing technical support to potential legislative provisions related to harmonization, should Congress request it.

Additional NHTSA Response

Response to 1:

We understand that because EPA's program contains more flexibilities than the CAFE program, some manufacturers find it easier to comply with EPA's standards in certain model years. However, under the joint National program, a manufacturer may build a fleet of vehicles that complies with both standards. The manufacturer has the flexibility to choose how to comply.

Response to 2:

It is up to manufacturers how they choose to comply. If a manufacturer relies heavily on EPA-only flexibilities for GHG compliance, it may be more difficult to meet NHTSA's CAFE standards, but that does not absolve the manufacturer of its legal requirement to comply with the CAFE standards or pay civil penalties.

Response to 3:

In the 2012 Final Rule, considering manufacturers' ability to employ certain flexibilities, NHTSA estimated total fuel savings between model years 2017 – 2021, relative to the continuation of the MY 2016 standard, of about 65.3 billion gallons under the 2008 baseline, and about 66.5 billion gallons under the 2010 baseline. See Table I-9 of the Final Rule (77 Fed. Reg. at 62657, Oct. 15, 2012).

Response to 4:

NHTSA's obligation is to set standards that it believes, based on analysis, are maximum feasible, following the requirements of our statute.

Response to 5:

NHTSA is aware that proposals have been drafted.

Response to 6:

The Agency is available to provide technical assistance on amendments to the CAFE program statutes.

FRED UPTON, MICHIGAN
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FOURTEENTH CONGRESS
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House of Representatives
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October 12, 2016

Mr. Mitch Bainwol
President and CEO
Alliance of Automobile Manufacturers
803 7th Street, N.W., Suite 300
Washington, DC 20001

Dear Mr. Bainwol,

Thank you for appearing before the Subcommittee on Commerce, Manufacturing, and Trade and the Subcommittee on Energy and Power joint hearing entitled "Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

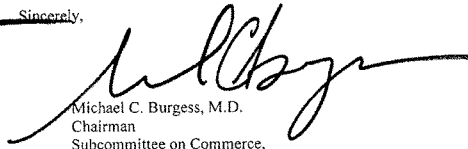
To facilitate the printing of the hearing record, please respond to these questions by the close of business on October 26, 2016. Your responses should be mailed to Giulia Giannangeli, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Giulia.Giannangeli@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittees.

Sincerely,



Fred Upton
Chairman



Michael C. Burgess, M.D.
Chairman
Subcommittee on Commerce,
Manufacturing, and Trade

cc: The Honorable Jan Schakowsky, Ranking Member, Subcommittee on Commerce, Manufacturing, and Trade

cc: The Honorable Bobby Rush, Ranking Member, Subcommittee on Energy and Power

Attachment



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October 26, 2016

Giulia Giannangeli
Legislative Clerk
Committee on Energy and Commerce
U.S. House of Congress
2125 Rayburn House Office Building
Washington, DC 20515

Re: Midterm Review and Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles, Hearing September 22, 2016.

Dear Ms. Giannangeli,

In response to Chairman Upton's and Chairman Burgess' letter of October 12, 2016, attached you will find responses to the additional questions for the record associated with the referenced joint hearing of the Subcommittee on Commerce, Manufacturing, and Trade, and the Subcommittee on Energy and Power.

Sincerely,

Jennifer Thomas
Vice President, Federal Government Affairs
Alliance of Automobile Manufacturers

Attachment

The Honorable Michael C. Burgess M.D.

1. In your opinion, are advances in conventional internal combustion engine technology (i.e., non-hybrid) sufficient by themselves to achieve the current standards for model year 2025? If not, could you please provide your estimates for how much of each of the following technologies (as defined in the TAR) will be required to achieve the current standards for model year 2025: (a) mild hybrid, (b) full hybrid, (c) plug-in hybrid electric vehicle, and (d) electric vehicle.

- A. Automakers, suppliers, and national laboratories agree that advances in conventional internal combustion engine technology are not expected to be sufficient by themselves to achieve the currently promulgated standards for model year 2025.

In the Alliance of Automobile Manufacturers (Alliance) opinion, the MY2025 standards cannot be met with the mix of technologies modeled by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) in their recent Draft Technology Assessment Report (Draft TAR)¹ and that greater electrification will be required. The Alliance and Association of Global Automakers (Global Automakers) both submitted comments to this effect in response to the Draft TAR.^{2,3} Nearly every automaker in the United States is represented by these two trade associations. This position is also supported by automotive suppliers such as BorgWarner.⁴ Increased electrification will result in increased costs to consumers and raises manufacturer concerns on customer acceptance of these advanced technologies.

In addition to automakers and suppliers, a recent study by Oak Ridge National Laboratory draws similar conclusions: "[t]he path to meeting 2025 standards will likely involve significantly larger numbers of hybrid electric powertrain vehicles and/or plug-in vehicles being sold, compared to the current U.S. sales of such

¹ "Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025." Office of Transportation and Air Quality, U.S. Environmental Protection Agency; National Highway Traffic and Safety Administration, U.S. Department of Transportation; California Air Resources Board. EPA-420-D-16-900, July 2016. (Hereinafter "Draft TAR".)

² Alliance of Automobile Manufacturers. *Comment submitted by Michael Hartrick, Director of Fuel Economy and Climate, Alliance of Automobile Manufacturers.* "Alliance of Automobile Manufacturers Comments on Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025." September 26, 2016. Docket EPA-HQ-OAR-2015-0827-4089. ii.

³ Association of Global Automakers, Inc. *Comment submitted by Julia M. Rege, Director, Environment and Energy, Association of Global Automakers, Inc.* "Comments of the Association of Global Automakers: Midterm Evaluation Draft Technical Assessment Report for Model Year 2022-2025 Light Duty Vehicle GHG Emissions and CAFE Standards." September 26, 2016. Docket EPA-HQ-OAR-2015-0827-4009.

⁴ BorgWarner Inc. *Comment submitted by Erika Nielsen, Director, Global Government Affairs, BorgWarner Inc.* "Re: Docket: EPA-HQ-OAR-2015-0827 and NHTSA-2016-0068 Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles-Phase 2 Notice of Availability: Midterm Evaluation Draft Technical Assessment Report for Model Years 2022-2025 Light Duty Vehicle GHG Emissions and CAFE Standards." September 26, 2016. Docket EPA-HQ-OAR-2015-0827-4315.

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Re: Midterm Review and Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles, Hearing September 22, 2016.

vehicles,” and “[i]t will be quite difficult for the most efficient gasoline vehicles to reach 29%-31% combined-cycle efficiency, but this is the level the gasoline fleet would need to average to comply with the 2025 regulations...”⁵

B. Actual vehicle data from EPA shows that only electrified light-duty vehicles meet their 2025 targets.

In its most recent fuel economy and greenhouse gas “trends” report, EPA shows that less than 5% of total U.S. light-duty vehicle production meets its MY2025 target greenhouse gas requirement. In addition, all such vehicles with any significant production are hybrid electric vehicles, plug-in hybrid electric vehicles, or battery electric vehicles.⁶

C. EPA and NHTSA analyses in the Draft TAR suggest much greater levels of electrification than those observed in the fleet today will be needed for compliance in 2025.

In the Draft TAR, EPA and NHTSA provide their estimates for potential mixes of technology necessary to meet the standards.⁷ The agencies purport that the standards can be largely met with only “...modest amounts of hybridization, and very little full electrification...”⁸ However, their data also suggests significant growth in electrified vehicle production over the levels observed in the present light-duty vehicle market will be required.

In the case of EPA, mild hybrid electric vehicles (MHEVs) are projected in over 18% of the fleet.⁹ In 2015, almost no sales of this technology occurred (<0.1%).¹⁰ Combined plug-in hybrid electric vehicles (PHEVs) and battery electric vehicles (BEVs) sales will also need to grow to meet EPA’s projections from 0.7% in 2015 to 4.3% in 2025, a six-fold increase over the next decade.^{11,12}

NHTSA’s analysis similarly predicts large increases in electrification. Strong (full) hybrid electric vehicles (HEVs) grow to 14% by 2025.¹³ Such growth would be truly impressive given that the market for HEVs has remained stagnant, averaging less than 3% over the past seven years, and only exceeding 3% a single year (2013).¹⁴

⁵ Thomas, J., “Vehicle Efficiency and Tractive Work: Rate of Change for the Past Decade and Accelerated Progress Required for U.S. Fuel Economy and CO₂ Regulations,” SAE Int. J. Fuels Lubr. 9(1):2016, doi:10.4271/2016-01-0909.

⁶ “Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2015.” U.S. Environmental Protection Agency. EPA-420-R-15-016, December 2015. 119.

⁷ Draft TAR at ES-10, Table ES-3.

⁸ Draft TAR at ES-9.

⁹ Draft TAR at 12-29, Table 12.33.

¹⁰ “MY 2015 Baseline Study.” Novation Analytics. September 19, 2016. 42. Available at Docket ID EPA-HQ-OAR-2015-0827 as “Attachment 10: Novation Analytics MY 2015 Baseline Study.”

¹¹ Ward’s Automotive. “U.S. Light Vehicle Sales, December 2015.” January 5, 2016.

¹² Draft TAR at 12-29, Table 12.33.

¹³ Id. at ES-10, Table ES-3.

¹⁴ Ward’s Automotive. “U.S. Light Vehicle Sales...” 2009-2015 data.

- D. Further analysis will be required to project the degree of electrification required in the U.S. light-duty vehicle fleet to meet future standards.

Given automakers' concerns with the technical analysis provided by the agencies in the Draft TAR, we believe that it will be critical for the agencies to work cooperatively with all stakeholders to correct the issues identified¹⁵ and to reassess the likely technologies required for compliance prior to proposing a determination of the appropriateness of the 2022-2025 standards.

The Alliance continues to work on an analysis of what kind of mix of advanced conventional, MHEV, HEV, PHEV, and BEV vehicles will be necessary to comply with the MY2022-2025 standards. We will be happy to share such results with the agencies and Congress when they become available.

2. According to Table ES-3 of the TAR, EPA's compliance pathway for meeting the MY2025 GHG standard envisions that 44% of vehicles would use higher compression ratio, naturally aspirated gasoline engines. If a manufacturer does not have that type of engine in any of its vehicles today, what steps would it have to take in order to integrate that type of engine in its product line, and how long would it take for it to reach a 44% penetration rate?

- A. The high compression ratio (HCR) naturally aspirated engines referred to by EPA include additional technologies for high greenhouse gas and fuel consumption benefits.

The 44% "higher compression ratio, naturally aspirated gasoline engines" referred to by TAR Table ES-3 are generally considered to be "Atkinson cycle" engines in non-HEV applications.¹⁶ Current examples of such technology are limited to a single automaker (Mazda) and represent less than 2% of the vehicles sold in the United States.¹⁷

Moreover, 90% of the 44% referred to in Table ES-3 are actually an agency-projected future engine which includes the present technology with an even higher compression ratio, cooled EGR, cylinder deactivation and direct injection technologies.¹⁸ (Advanced Atkinson Cycle Engine Technology)

¹⁵ See Alliance of Automobile Manufacturers. "Alliance of Automobile Manufacturers Comments on Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025." September 26, 2016. Docket EPA-HQ-OAR-2015-0827-4089.

¹⁶ Draft TAR at 12-29, Table 12.33, "ATK2." The abbreviation "ATK2" means a non-hybrid electric vehicle Atkinson cycle engine (5-282).

¹⁷ U.S. Environmental Protection Agency. *2014-2025 Production Summary and Data with Definitions*. "2014MY Baseline with Tech and Market Tabs for Docket.xlsx." Docket EPA-HQ-OAR-2015-0827-0402. <https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0827-0402>.

¹⁸ U.S. Environmental Protection Agency. "Optimization Model for reducing Emissions of Greenhouse gases from Automobiles (OMEGA)." <https://www3.epa.gov/otaq/climate/models.htm>. (Follow "OMEGA pre-processor,

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- B. Manufacturers would need to upgrade an existing engine platform and/or design a new engine to integrate the Advanced Atkinson Cycle Engine Technology modeled by EPA.

The Advanced Atkinson Cycle Engine technology generally modeled by EPA requires changes to increase compression ratio, enablement of late intake valve closing, cylinder deactivation, cooled EGR and gasoline direct injection – the technical background below elaborates on these necessary technical modifications. Higher octane fuel (premium fuel) may also be required to maximize the fuel economy of these engines. Certain engines currently in production have one or more of the required features, but it is important to note that none exist with all of these technologies in combination. In most cases, either an engine redesign to add technology or a completely new engine design will be required to integrate Advanced Atkinson Cycle Engine Technology into an OEM's product line – adding significant cost and time to an already lengthy manufacturing process.

Technical Background on Advanced Atkinson Cycle Engine Technology:

Compression ratio increases require an increase in the ratio of total volume of the engine cylinder at the bottom of the piston stroke to the total volume of the engine cylinder at the top of the stroke. This can be achieved by several means but all are generally considered significant changes to a production engine including modifications to the engine block, head(s), crankshaft, connecting rods, and/or pistons. Additionally, depending on engine design, modifications may be necessary to the valve train to accommodate other changes.

Implementing a cylinder deactivation system involves hardware changes to valve actuation systems, control software development, and other potential changes to mitigate or prevent noise-vibration-harshness (NVH) caused by the deactivation of the cylinders.¹⁹ Cylinder deactivation currently has an overall industry penetration of less than 25% in the United States.²⁰ A number of manufacturers and their supplier partners have developed variants of cylinder deactivation.²¹

The addition of cooled EGR technology requires control system software, control valve(s), plumbing to route exhaust gases from the exhaust manifold to the intake air, and a heat exchanger to cool the hot exhaust gases.²² The hardware required may require changes to vehicle or engine designs to accommodate the space required. Additionally, the engine cooling system may need to be modified to

Technology cost development, and Input / Output files used in the Draft TAR analysis (ZIP) link located in the OMEGA 1.4.56 section.) (Last updated July 18, 2016.) Data extracted from the files located therein.

¹⁹ Draft TAR at 5-17.

²⁰ "Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2015." U.S. Environmental Protection Agency. EPA-420-R-15-016, December 2015. 48.

²¹ Id. at 48.

²² Draft TAR at 5-28.

handle increased heat rejection requirements. Cooled EGR is a relatively recent development for spark-ignited gasoline engines.²³ The technology was installed on less than 3% of the fleet in MY2014.²⁴

Gasoline direct injection involves changes to the cylinder head and fuel system. The cylinder head(s) must be modified to accommodate injection of fuel directly into the cylinder. The fuel system must be modified to use high pressure fuel injectors and a high pressure fuel pump.

Additionally, although not a specific modification to the engine, high octane (premium) fuel may be required to maximize the potential greenhouse gas and fuel economy benefits. In general, high octane gasoline enables greater fuel efficiency, albeit at increased fuel costs to customers.

- C. Manufacturers will incur significant expenses to implement Advanced Atkinson Cycle Engine technology, particularly if such implementation occurs sooner than an originally planned engine redesign.

In its report “Cost Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles,” the National Research Council (NRC) provides an estimate of \$0.75 to \$1.5 billion investment for a manufacturer to develop a new engine.²⁵ Because of the high capital requirements, manufacturers typically only redesign engines every 10-15 years,²⁶ allowing the investment to be spread over hundreds of thousands to millions of vehicles. If a manufacturer needed to redesign an engine more quickly to ensure regulatory compliance, previous investments become stranded capital, increasing financial pressure on the manufacturer and resulting in higher costs to consumers.

Such concerns are of particular importance to manufacturers which have already invested heavily in downsized turbocharged engines, a technology EPA had originally projected to achieve 87% penetration in the MY2025 fleet.²⁷

- D. EPA’s flawed modeling overestimates the benefits of Advanced Atkinson Cycle Engine Technology; EPA was unable to validate their modeled benefits even in a laboratory setting.

EPA derived the greenhouse gas (GHG) and fuel consumption improvement benefits of an Advanced Atkinson cycle engine with a theoretical model.²⁸ EPA relied on benchmarking data from a present Mazda

²³ Id. at 5-28.

²⁴ U.S. Environmental Protection Agency. *2014-2025 Production Summary and Data with Definitions*. “2014MY Baseline with Tech and Market Tabs for Docket.xlsx.” Docket EPA-HQ-OAR-2015-0827-0402.

<https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0827-0402>.

²⁵ National Research Council. “Cost, Effectiveness and Deployment of Fuel Economy Technologies for Light-Duty Vehicles.” Washington, D.C.: The National Academies Press. 2015. 256.

²⁶ Id. at 256.

²⁷ “2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards.” U.S. Environmental Protection Agency and U.S. Department of Transportation, National Highway Traffic Safety Administration. 77 Fed. Reg. 62623, 62870 (October 15, 2012).

²⁸ Draft TAR at 5-280.

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SkyActiv engine, and then applied theoretical improvements to create the modeled Advanced Atkinson Cycle Engine with higher compression ratio, cooled EGR, and cylinder deactivation.²⁹ In its comments on the TAR, the Alliance of Automobile Manufacturers noted multiple technical problems in the development of the baseline data and in the subsequent development of the theoretical models which likely led to over-optimistic results modeled by EPA.³⁰

Furthermore, during the development of the Advanced Atkinson Cycle Engine models supporting the Draft TAR, EPA attempted to validate the modeled benefits of this combination of technologies in a laboratory setting. EPA's description of the results was that they could not be validated due to the inability to operate the test engine at the necessary speed and load conditions due to the onset of "knock" (a condition which can result in engine damage and failure).³¹

Therefore, if actual achieved benefits are lower than predicted by EPA, greater penetrations of this technology package will be necessary to achieve the same benefit, and/or other costly technologies will need to be adopted to ensure compliance.

- E. The time to reach a 44% penetration rate will vary by manufacturer; the Alliance estimates it will take more than a decade (more than the eight years remaining before the 2025 model year).

The question of exactly how long it will take for Advanced Atkinson Cycle engine technology to reach a 44% penetration rate is difficult to answer. Some manufacturers may reach high penetration rates relatively quickly, particularly those which have already invested in more of the underlying technologies which are required. Other manufacturers may require significantly more time or may choose to continue the development and implementation of other alternatives such as turbocharging and downsizing for reasons such as those described above.

The NRC studied the time required to implement significant new engine technologies, e.g. engine downsizing and turbocharging, finding that new engine designs require 2-3 years for engine development alone and that an additional 1-2 years are required for vehicle integration, including emissions certification.³² The Alliance maintains that the degree of modifications necessary to implement an Advanced Atkinson Cycle Engine would be similar to that required for a downsized and turbocharged engine as studied by the National Research Council. Therefore, should manufacturers choose to invest in

²⁹ Lee, S., Schenk, C., and McDonald, J., "Air Flow Optimization and Calibration in High-Compression-Ratio Naturally Aspirated SI Engines with Cooled-EGR," SAE Technical Paper 2016-01-0565, 2016, doi:10.4271/2016-01-0565.

³⁰ Alliance of Automobile Manufacturers. "Alliance of Automobile Manufacturers Comments on Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025." September 26, 2016. Docket EPA-HQ-OAR-2015-0827-4089. 46-50.

³¹ Lee, S., Schenk, C., and McDonald, J., "Air Flow Optimization and Calibration in High-Compression-Ratio Naturally Aspirated SI Engines with Cooled-EGR," SAE Technical Paper 2016-01-0565, 2016, doi:10.4271/2016-01-0565.

³² National Research Council. "Cost, Effectiveness and Deployment of Fuel Economy Technologies for Light-Duty Vehicles." Washington, D.C.: The National Academies Press. 2015. 257.

the described technology, it would generally take about five years before the technology is available to begin installation in production vehicles, even at low fleet penetrations.

Beyond just availability, it also takes additional time to apply the technology in specific vehicles and to achieve penetration across the fleet. In some vehicles the implementation would likely be relatively straightforward. In others implementation may require waiting for a vehicle redesign (e.g. if the cooled EGR system space requirements could not be met in an existing vehicle.) The adoption rate would also likely be influenced by how many vehicle models a particular engine is designed to power for each particular manufacturer. Given the time required to develop the described technology and then to subsequently apply it across multiple vehicles, it is reasonable to assume a minimum of a decade or more to reach 44% penetration (under favorable circumstances and absent other constraints or decisions which could potentially slow the introduction of Advanced Atkinson Cycle Engines). Automakers are already building MY2017 vehicles and product investment decisions have likely already been made for the next couple of years, further increasing the lead-time needed to achieve the penetrations described by EPA. Most importantly, the Alliance questions the viability of the 44 percent penetration rate for Advanced Atkinson Cycle Engine technology because even with such engine technology (and the resulting costs to manufacturers), the expected engine efficiencies are not sufficient to comply with future Fuel Economy Standards (MY 2025) – which points to additional ICE technologies and/or electrification being necessary for future compliance.

F. Modeled penetrations of Advanced Atkinson Cycle Engines far exceed 44% for certain manufacturers.

Not only does EPA model high compression ratio, naturally aspirated engines at 44% of the overall U.S. fleet,³³ certain manufacturers are estimated to need much higher penetrations of Advanced Atkinson Cycle Engines. For example, Jaguar Land Rover is estimated by EPA to utilize 72% Advanced Atkinson Cycle Engines in its fleet by 2025, and four other manufacturers are projected to exceed 50% penetration.³⁴

3. In the TAR, the EPA states that in its modeling, “the California Zero Emission Vehicles (ZEV) program is considered in the reference case fleet; therefore, 3.5% of the fleet is projected to be full EV or PHEV in the 2022-2025 timeframe due to the ZEV program and the adoption of that program by nine additional states.” TAR at ES-10. Since a significant portion of the required GHG reductions will be met through manufacturing electric-drive vehicles for the ZEV mandate, shouldn’t EPA have considered

³³ Draft TAR at ES-10, Table ES-3.

³⁴ U.S. Environmental Protection Agency. “Optimization Model for reducing Emissions of Greenhouse gases from Automobiles (OMEGA).” <https://www3.epa.gov/otaq/climate/models.htm>. (Follow “OMEGA pre-processor, Technology cost development, and Input / Output files used in the Draft TAR analysis (ZIP) link located in the OMEGA 1.4.56 section.) (Last updated July 18, 2016.) Data extracted from the files located therein.

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those costs in its assessment of the costs of the regulation? If EPA had considered the costs of producing electric-drive vehicles, what impact would that have had on the cost estimates in the TAR?

Fundamentally, the California ZEV program constrains the technology choices manufacturers have for meeting the federal GHG regulations. Although the federal GHG regulations generally allow manufacturers to choose any combination of technologies which enable compliance with the standards, the presence of the California ZEV program removes some of this flexibility, requiring manufacturers to sell plug-in electric vehicles (PEV) and/or fuel cell vehicles.³⁵ EPA recognized this technology constraint in the Draft TAR by including an estimated volume of plug-in electric vehicles required for each manufacturer to comply with the California ZEV program.³⁶ In its analysis, EPA accounts for the GHG benefits of these vehicles, but at zero cost. In so doing, the Alliance believes that EPA has presented a misleading assessment of the costs to customers and manufacturers of meeting the GHG and closely related ZEV program regulations.

- A. EPA should have considered the costs of the California ZEV program in its assessment of the costs of the greenhouse gas regulation.

In its comments on the Draft TAR, the Alliance sets forth two arguments on why the costs for the California ZEV program should be included in the assessment of the costs of the greenhouse gas regulation, which are summarized here. First, the integrity of cost-benefit analysis requires making equivalent assumptions on both the cost and benefit side of the analysis. By including the benefits, but not the costs of the California ZEV program, EPA violates this basic tenet. Second, EPA has explained in its guidance the position that it is generally appropriate to include existing regulations in the cost baseline because, presumably, those costs have been accounted for elsewhere and should not be counted twice.³⁷

³⁵ See 13 California Code of Regulations §§ 1962.1 and 1962.2

³⁶ Draft TAR at ES-10.

³⁷ See National Center for Environmental Economics, Office of Policy, U.S. Environmental Protection Agency, "Guidelines for Preparing Economic Analyses" (December 17, 2010) at 5-9. Cited authority states "[i]f a proposed regulation is expected to increase compliance with a previous rule, the correct measure of the costs and benefits generally excludes impacts associated with the increased compliance. This is because the costs and benefits of the previous rule were presumably estimated in the economic analysis for that rule, and should not be counted again for the proposed rule."

However, EPA has not considered the cost of the ZEV program at any point in time.³⁸ Please refer to the Alliance's comments on the Draft TAR for additional detail.³⁹

- B. Inclusion of California ZEV program costs would have significantly increased the cost estimates in the Draft TAR.

PEV technology can be much more expensive than other potential technologies for reducing greenhouse gas emissions. A recent analysis by Honda, based on PEV technology costs from the draft TAR, estimated that if ZEV program costs were included in EPA's analysis, the average per vehicle cost would increase by \$356 (and approximate 40% increase over the costs shown in the Draft TAR).^{40,41} Average cost impacts would potentially be much higher for manufacturers with relatively higher sales in states which have adopted the California ZEV program.⁴²

- C. Direct costs of the California ZEV program are not the only issue – customer acceptance and infrastructure are also concerns which need to be addressed by the midterm evaluation.

Aside from the direct costs of PEV technology, manufacturers have additional concerns with customer acceptance and infrastructure.

4. Mr. German mentioned a study prepared by Novation Analytics at the behest of your trade associations and implied that it was backwards looking and didn't account for future technologies. Is this true, and if not, why not?

³⁸ In evaluating whether to grant California the waiver necessary to implement the ZEV mandate, EPA did not fully evaluate the costs of the mandate at that time, either. Instead, EPA largely deferred to CARB estimates. See, e.g., U.S. Environmental Protection Agency, "Notice of Decision Granting a Waiver of Clean Air Act Preemption for California's Advanced Clean Car Program and a Within the Scope Confirmation for California's Zero Emission Vehicle Amendments for 2017 and Earlier Model Years," 78 Fed. Reg. 2111, 2115 (Jan. 9, 2013), noting that in the waiver context, EPA gives "very substantial deference to California's judgment" on the balancing of costs and benefits, and 78 Fed. Reg. 2118, noting that in decision whether to grant a waiver, EPA "provide[s] California with the broadest possible discretion in setting regulations that it finds protective of the public health and welfare while limiting EPA's review to a narrow role that provides substantial deference to the State."

³⁹ Alliance of Automobile Manufacturers. "Alliance of Automobile Manufacturers Comments on Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025." September 26, 2016. Docket EPA-HQ-OAR-2015-0827-4089. xi-xiii.

⁴⁰ Bienfeld, Robert. "Advanced Powertrains 2025 & Beyond – What's Driving Us?" Presentation at Center for Automotive Research Management Briefing Seminars. 2016. Slides 10 and 14.

⁴¹ Draft TAR at ES-9.

⁴² ZEV Program requirements are specific to each manufacturer and are based on a manufacturer's sales in a state administering the California ZEV program. As sales increase, PEV sales requirements increase. Manufacturers with relatively higher sales markets in the ZEV program states have greater costs to amortize over their production volume.

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The Novation Analytics study referred to by Mr. German is "Technology Effectiveness – Phase 1: Fleet-Level Assessment" (Fleet Level Assessment).⁴³ The study draws the following conclusions:⁴⁴

- The MY 2021 and 2025 fuel economy and greenhouse gas standards cannot be met with the suite of technologies assumed by the agencies.
- Higher deployment rates of electrification, alone or in combination with other advanced spark ignition powertrain technology, will be required than were projected by both EPA and NHTSA in the MYs 2017-2025 rulemaking.

Mr. German's implications are not accurate. The following specific rebuttals to Mr. German's statements and written testimony are provided in response to your question.

A. Novation Analytics accounted for future technologies in the Fleet Level Assessment Study.

In its fleet level assessment, Novation Analytics assumed the same technology sets as the agencies did in the 2012 final rulemaking.^{45,46} These included the EPA and NHTSA assumptions for vehicle mass, aerodynamics, and tire improvements,⁴⁷ and accounted for regulatory credits.⁴⁸ Powertrain technologies included downsized turbocharged engines with efficiencies beyond any current non-hybrid spark-ignited internal combustion engine with the same types of advanced future transmissions described in the TAR.^{49,50}

Mr. German is correct in his assertion in that the study did not include some of the technologies considered by the agencies in the TAR such as Advanced Atkinson Cycle Engines. However, this point is without merit. The technologies that were studied by Novation Analytics exceeded the efficiencies of current spark-ignited engines. In fact, EPA's own analysis of the benefits of the technologies modeled by Novation Analytics are comparable or better than the Advanced Atkinson Cycle Engines now relied upon by EPA in the TAR analysis.⁵¹

⁴³ "Technology Effectiveness – Phase 1: Fleet-Level Assessment." Novation Analytics. October 19, 2015. Available at Docket ID EPA-HQ-OAR-2015-0827-4089 as "Attachment 1: Technology Effectiveness – Phase I: Fleet Level (version 1.1)."

⁴⁴ Id. at 8 et seq.

⁴⁵ "Technology Effectiveness – Phase 1: Fleet-Level Assessment." Novation Analytics. October 19, 2015. 10.

⁴⁶ "2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards." U.S. Environmental Protection Agency and U.S. Department of Transportation, National Highway Traffic Safety Administration. 77 Fed. Reg. 62623 (October 15, 2012).

⁴⁷ "Technology Effectiveness – Phase 1: Fleet-Level Assessment." Novation Analytics. October 19, 2015. 10.

⁴⁸ Id. at 29.

⁴⁹ Id. at 57.

⁵⁰ Draft TAR at 5-42 et seq.

⁵¹ U.S. Environmental Protection Agency. "Lumped Parameter Model (LPM) for Light-Duty Vehicles." <https://www3.epa.gov/otaq/climate/lpm.htm>. (Follow "Download the executable version of LPM_DTAR.exe.") (Last updated July 18, 2016.) Vehicle type standard car modeled with 24 bar Advanced gas stoichiometric gas direct injection provides 15.5% benefit; the same vehicle type modeled with Atkinson cycle with cooled EGR and

B. Novation Analytics accounted for increased future technology benefits on current technologies.

Future generations of technology generally incorporate learnings from previous generations, leading to increased efficiency and other positive developments. For example, Toyota has built four generations of the Prius HEV. Each generation has made incremental improvements to the hybrid electric vehicle powertrain, resulting in improved fuel economy.

Such learning was incorporated by Novation Analytics through statistical analyses of fuel economy technologies. When the same set of technologies is applied to similar vehicles, the resulting fuel economy benefit will be a range, not a single point. The majority will achieve benefits somewhere near the center of the range, while others will achieve either lower or higher benefits. However, through learning, the average across the fleet will gradually improve towards what was originally best-in-class. Novation Analytics accounted for such learning by assuming the average benefit of a technology in the future will improve towards the best-in-class current examples of such technology. Said mathematically, such learning is incorporated by assuming the average benefit of a technology moves toward higher percentiles (90th percentile in the case of the Fleet Level Assessment).

In Mr. German's witness statement, he attempts to discredit the Novation Analytics Fleet Level Assessment by pointing to its modeling of a 90th percentile naturally aspirated engine (with high-spread transmission, but without stop / start technology) at 22.8% energy conversion efficiency in comparison to a current engine at 25.1% efficiency.⁵² Mr. German's analysis fails to recognize that he is comparing a single data point to an assumed future average. Of course there will be examples of technology better than average, just as there will be examples of the same technology that are below average – this is the heart of the mathematical concept of “average.” His analysis also fails to recognize that the higher efficiency engine he refers to was included in the Novation Analytics statistics used to develop the 90th percentile upon which the future average was based.

It warrants noting that the very techniques criticized by Mr. German were similarly applied by Novation Analytics in its study of vehicle load reduction potential (i.e. reduced mass, aerodynamics, and tire rolling resistance loads) sponsored by the State of California's Air Resources Board (CARB)⁵³ that was later cited in the TAR.⁵⁴

intake cam phasing) provides 11.7% benefit. Note that the Alliance of Automobile Manufacturers believes that both of these values are over-stated. Data provided as an example only.

⁵² German, John. Witness Statement to the House, Subcommittee on Commerce, Manufacturing, and Trade and Subcommittee on Energy and Power, Committee on Energy and Commerce. *Midterm Review and Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards For Motor Vehicles*, Hearing, September 22, 2016. Available at <http://docs.house.gov/meetings/IF/IF17/20160922/105350/HHRG-114-IF17-Wstate-GermanJ-20160922.pdf>. (Accessed 10/14/2016)

⁵³ “Technical Analysis of Vehicle Load Reduction Potential for Advanced Clean Cars (Contract 12-313).” ControlTec, LLC. April 29, 2015. The division of Control-Tec, LLC which prepared this report took the name Novation Analytics when it separated from Control-Tec, LLC.

⁵⁴ Draft TAR at Appendix A.

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- C. Current diesel powertrain efficiency is a logical proxy for future gasoline engine powertrains as assessed by Novation Analytics.

Mr. German asserts that Novation Analytics' use of current compression-ignition engines (typically diesel) as a proxy for future advanced gasoline engines is an "unfounded assumption. He goes on to state that "any competent analysis of upcoming powertrain technology (which includes transmissions and accessories, not just engines) finds that 2025 gasoline engine powertrains will exceed current diesel powertrain efficiency."⁵⁵

At face value, this is merely Mr. German's opinion. He fails to present any evidence of studies showing future spark-ignited engines as exceeding diesel efficiency. His caveat including transmissions and accessories only conflates the issue, as such technologies were also considered in the Novation Analytics Fleet Level Assessment, as previously described.

In contrast, Novation Analytics has presented reasonable evidence for the use of the current diesel engine efficiency boundary as a logical proxy for future advanced gasoline engines. Novation Analytics reasons that the strategies which generally make current diesel engines more efficient are the same strategies which are being pursued for future advanced gasoline engines. These include higher compression ratios and reduced pumping losses.⁵⁶

Furthermore, there is ample evidence that manufacturers and researchers are targeting "diesel-like" efficiency for future advanced gasoline engines. Delphi (an automotive supplier) recently described efforts to develop an advanced gasoline engine with program objectives including the "[achievement] of diesel-like fuel efficiency."⁵⁷ Similarly, in 2013, Southwest Research Institute launched a cooperative research program targeting diesel-like fuel consumption in an advanced gasoline engine.⁵⁸

5. If the assumptions in the TAR prove wrong, what, if anything, can we do to mitigate the damage to consumers and industry?

⁵⁵ German, John. Witness Statement to the House, Subcommittee on Commerce, Manufacturing, and Trade and Subcommittee on Energy and Power, Committee on Energy and Commerce. *Midterm Review and Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards For Motor Vehicles*, Hearing, September 22, 2016. Available at <http://docs.house.gov/meetings/IF/IF17/20160922/105350/HHRG-114-IF17-Wstate-GermanJ-20160922.pdf>. (Accessed 10/14/2016)

⁵⁶ "Technology Effectiveness – Phase II: Vehicle-Level Assessment." Novation Analytics. September 20, 2016. Available at Docket ID EPA-HQ-OAR-2015-0827-4089 as "Attachment 2: Technology Effectiveness - Phase II: Vehicle-Level Assessment (version 1.0)."

⁵⁷ Seilnau, M., Moore, W., Sinnamon, J., Hoyer, K. et al., "GDCI Multi-Cylinder Engine for High Fuel Efficiency and Low Emissions," SAE Int. J. Engines 8(2):2015, doi:10.4271/2015-01-0834.

⁵⁸ Southwest Research Institute. "SwRI launches third high-efficiency gasoline engine consortium." March 7, 2013. <http://www.swri.org/9what/releases/2013/hedge-3.htm#WADfpSQnVFd>. (Accessed 10/14/2016)

The standards set forth under the One National Program (ONP) are ambitious and aggressive, especially in the later years of the program. The first phase of the One National Program (MY2012-2016) has yielded significant progress and automakers remain committed to continued efficiency improvements. However, it is imperative that policymakers, stakeholders, and the public utilize the Mid-term Evaluation process to examine those factors and assumptions that shaped the joint rulemaking, finalized in 2012, and to evaluate the technical merits underpinning the ONP. Much has changed in four years – most notably, fuel prices and changes in consumer purchasing habits. These trends are important to note since automakers are judged not by what they produce, but by what consumers buy.

Contrary to the agencies' findings in the Draft TAR, automakers maintain that meeting the aggressive MY 2022-2025 standards likely will require a greater degree of vehicle electrification. This stark contrast in the levels of electrification necessary to meet the aggressive standards versus actual sales of electric vehicles highlights the daunting challenge facing automakers. Consumer adoption of alternative powertrain vehicles has not lived up to expectations despite a 174 percent increase in such models being available to consumers since 2010. The Alliance expects this trend to continue in a low fuel price environment as projected by the Energy Information Administration (EIA).⁵⁹ A failure to take these marketplace realities into account could result in unintended financial consequences.

Additionally, policymakers must be mindful of the impact the aggressive standards have on consumer affordability. Over the past 23 years, average new car prices have increased by more than 60 percent, to an all-time high of \$34,428.⁶⁰ The Draft TAR fails to fully examine consumers' ability to afford the increasingly expensive technologies needed to meet the standards. If consumers have difficulty affording the cost of new technologies for compliance, they may decide to hold onto their current vehicles, disrupting the "virtuous cycle" of fleet turnover that adds safer and more fuel-efficient new vehicles to the roadways.

Nationwide, eight million workers and their families depend on the auto industry.⁶¹ Each year, the industry generates \$500 billion in paychecks, while generating \$70 billion in tax revenues across the country.⁶² Last month, the Center for Automotive Research (CAR) released an economic analysis entitled "The Potential Effects of the 2017-2025 EPA/NHTSA GHG/Fuel Economy Mandates on the U.S. Economy."⁶³ In this study, CAR analyzed nine scenarios using varying fuel prices and technology costs and

⁵⁹ "Annual Energy Outlook 2015 with projections to 2040." U.S. Energy Information Administration. Available at <http://www.eia.gov/forecasts/archive/aeo15/> (Accessed 10/20/2016)

⁶⁰ <http://mediaroom.kbb.com/record-new-car-transaction-prices-reported-december-2015>

⁶¹ "Contribution of the Automotive Industry to All Fifty States and the United States." Center for Automotive Research. January, 2015. Available at <http://www.cargroup.org/?module=Publications&event=View&pubID=16>.

⁶² *Id.* at 1.

⁶³ "The Potential Effects of the 2017-2025 EPA/NHTSA GHG/Fuel Economy Mandates on the U.S. Economy." Center for Automotive Research. September, 2016. Available at <http://www.cargroup.org/?module=Publications&event=View&pubID=143>. (Accessed 10/20/2016)

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found that significant job loss would result in eight of the nine scenarios.⁶⁴ CAR concluded “if the value of fuel savings to the new vehicle buyer falls short of the cost of mandated fuel economy technologies, then U.S. automotive sales, production, manufacturing, and retail employment will fall, which will result in serious consequences for the entire U.S. economy.”⁶⁵ It is imperative that we get the midterm evaluation process right, without unnecessary harm to the auto industry and the economy as a whole.

We appreciate the oversight of this Committee. We strongly encourage the Committee to continue to help ensure this mid-term evaluation process is open, robust and transparent. Additionally, we urge the Committee to explore avenues to better harmonize the EPA and NHTSA programs to ensure “One National Program” is truly One National Program for motor vehicle fuel economy standards – eliminating a piecemeal, fragmented automotive policy that is inefficient and costly to everyone. The goal of the One National Program is not materializing; harmonization gaps exist – primarily between the EPA GHG and NHTSA CAFE credit trading programs. However, harmonization is a near-term problem that should be addressed outside of the mid-term evaluation process. As automakers assess their current situation and attempt to forecast future product development and customer demands, many are anticipating problems in managing compliance with the two different programs. In some cases, the inconsistencies between the two agencies likely will create a situation where an automaker is in compliance with EPA’s GHG program and simultaneously out of compliance and subject to civil penalties under the NHTSA CAFE program. The Alliance and Global Automakers, recently jointly petitioned the agencies to address some of these harmonization gaps; however, others cannot be addressed administratively and will require Congressional action.⁶⁶ We look forward to working with this Committee to ensure the goal of the One National Program is realized.

⁶⁴ Id. at 2.

⁶⁵ Id. at 2.

⁶⁶ *Petition for Direct Final Rule with Regard to Various Aspects of the Corporate Average Fuel Economy Program and the Greenhouse Gas Program*, submitted June 20, 2016 by Mitch Bainwoi (Pres. & CEO, Alliance) & John Bozzella (Pres. & CEO, Global Automakers) to Mark Rosekind, PhD (Admin., NHTSA) and Gina McCarthy (Admin., EPA).

FRED UPTON, MICHIGAN
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FOURTEENTH CONGRESS
Congress of the United States
House of Representatives

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October 12, 2016

Mr. Peter Welch
President
National Automobile Dealers Association
412 First Street, S.E.
Washington, DC 20003

Dear Mr. Welch

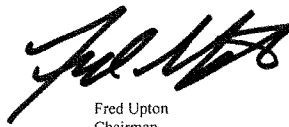
Thank you for appearing before the Subcommittee on Commerce, Manufacturing, and Trade and the Subcommittee on Energy and Power joint hearing entitled "Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

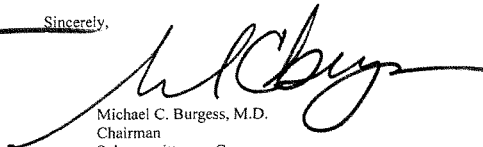
To facilitate the printing of the hearing record, please respond to these questions by the close of business on October 26, 2016. Your responses should be mailed to Giulia Giannangeli, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Giulia.Giannangeli@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittees.

Sincerely,



Fred Upton
Chairman



Michael C. Burgess, M.D.
Chairman
Subcommittee on Commerce,
Manufacturing, and Trade

cc: The Honorable Jan Schakowsky, Ranking Member, Subcommittee on Commerce, Manufacturing, and Trade

cc: The Honorable Bobby Rush, Ranking Member, Subcommittee on Energy and Power

Attachment

In response to an October 12, 2016 letter from Chairmen Upton and Burgess to NADA President Peter K. Welch requesting answers to questions for the record pertaining to the September 22, 2016 House Commerce, Manufacturing and Trade Subcommittee, and House Energy and Power Subcommittee hearing entitled, "Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles", NADA responds as follows:

The Honorable Michael C. Burgess M.D.

1. In your opinion, are advances in conventional internal combustion engine technology (i.e., non-hybrid) sufficient by themselves to achieve the current standards for model year 2025? If not, could you please provide your estimates for how much of each of the following technologies (as defined in the TAR) will be required to achieve the current standards for model year 2025: (a) mild hybrid, (b) full hybrid, (c) plug-in hybrid electric vehicle, and (d) electric vehicle.

Response to Question 1.

NADA concurs with the Alliance of Automobile Manufacturers and the Association of Global Automakers that the draft TAR significantly underestimates the degree to which hybrids, plug-in hybrids, and electric vehicle technologies will be necessary to meet the EPA/NHTSA MY 2025 standards. In this regard, NADA is actively working to assist its member dealers with the marketing of these cutting-edge technologies. For example, at the 2016 NADA Convention, dealers shared advice, experience and recommendations for capturing and retaining electric-vehicle customers during a workshop and panel discussion. Despite these efforts, NADA remains concerned that the higher costs and performance constraints associated with these technologies may limit their marketplace acceptance.

NADA also released a new publication: "A Dealer Guide to Marketing Electric Vehicles" (available for free to members - see attached). The guide provides dealers and their employees with detailed information and resources they can use to address customer issues regarding battery electric and plug-in hybrid vehicles.

2. According to Table ES-3 of the TAR, EPA's compliance pathway for meeting the MY2025 GHG standards envisions that 44% of vehicles would use higher compression ratio, naturally aspirated gasoline engines. If a manufacturer does not have that type of engine in any of its vehicles today, what steps would it have to take in order to integrate that type of engine in its product line, and how long would it take for it to reach a 44% penetration rate?

Response to Question 2.

NADA does not have this information.

3. In the TAR, the EPA states that in its modeling, "the California Zero Emission Vehicles (ZEV) program is considered in the reference case fleet; therefore, 3.5% of the fleet is projected to be full EV or PHEV in the 2022-2025 timeframe due to the ZEV program and the adoption of that program by nine additional states." TAR at ES-10. Since a significant portion of the required GHG reductions will be met through manufacturing electric-drive vehicles for the ZEV mandate, shouldn't EPA have considered those costs in its assessment of the costs of the regulation? If EPA had considered the costs of producing electric-drive vehicles, what impact would that have had on the cost estimates in the TAR?

Response to Question 3.

EPA/NHTSA should have considered the costs associated with the CARB's ZEV mandate in the TAR, as those costs will be real for the regulated OEMs, and for the millions of non-ZEV purchasers who will subsidize the manufacture and distribution of the ZEV vehicles mandated by CARB. The cost estimates in the TAR would have undoubtedly been higher if they had fully accounted for the ZEV mandate.

The Honorable Jan Schakowsky

Although the hearing was focused on the midterm review of the Corporate Average Fuel Economy Standards, I would like to take the opportunity of your appearance before our Committee to address a safety issue that continues to be a problem: defective Takata airbags.

You appeared before the Subcommittee on Commerce, Manufacturing, and Trade at hearing on October 21, 2015, titled "Examining Ways to Improve Vehicle and Roadway Safety." At that hearing, you stated, "If the vehicle has been deemed to be unsafe to drive either by the OEMs or by NHTSA, we would not put one of those cars in the hands of the consumer." And in follow-up questions for the record, you indicated that if NHTSA or a manufacturer issues a do-not-drive or stop-drive notice, "it would be inappropriate for a dealer to rent or loan that vehicle."

On June 30, 2016, NHTSA and Honda announced new test data that showed that seven model-year 2001-2003 Honda and Acura vehicles have a substantially higher risk of ruptures of the Takata airbags. Honda, at the recommendation of the Secretary of Transportation, told owners of these cars not to drive their cars only to the dealer to get them repaired.

In addition, some manufacturers are advising their customers to not have someone sit in the passenger seat of certain cars with recalled passenger-side Takata airbags until the defective airbags are replaced. For example, BMW recommends that no one sit in the

front passenger seat until that airbag is replaced.

1. Do your Association and your members consider Honda's statement that those seven cars should only be driven to the dealer for repair to be a "do-not-drive" notice?

Response to Question 1.

NADA concurs with the statement in the NHTSA press release (NHTSA 16-16, attached) issued June 30, 2016 that "Folks should not drive these vehicles unless they are going straight to a dealer to have them repaired immediately, free of charge." As you know, vehicle manufacturers have discretion to decide when to issue owner notices that instruct when vehicles subject to a defect or noncompliance safety recall should not be driven. Typically, recall notices that contain precautionary advice not to drive a vehicle also indicates how vehicle owners can arrange with their local dealers to obtain loaners or rentals and to have recalled vehicles towed to the dealership.

2. With regard to those seven Honda and Acura vehicles, has your Association advised its membership to ground those vehicles or have those vehicles repaired before selling, renting, or loaning them to consumers? What is the approximate number or percentage of your members that have done so?

Response to Question 2.

NADA generally advises its members not to sell an unrepaired, safety recalled used vehicle when a NHTSA-initiated recall notice, OEM-initiated recall notice, or related official document(s) instruct the vehicle owner not to drive the vehicle. NADA does not advise its members on specific recalls. That is the responsibility of the OEMs who manufactured the vehicles at issue.

3. For some vehicles subject to a passenger-side Takata airbag recall, some manufacturers have recommended that no one sit in the front passenger seat until that airbag is replaced. For those vehicles for which the automaker has made such a recommendation, has your Association advised its membership to ground vehicles with a defective passenger-side Takata airbag until the airbag has been replaced? What is the approximate number or percentage of your members that have done so?

Response to Question 3.

NADA does not advise its members on specific recalls. That is the responsibility of the OEMs who manufactured the vehicles at issue.

4. With regard to all vehicles subject to the Takata airbag recall, has your Association or have any of your members taken steps to ensure that no recalled car is sold, rented, or loaned unless the recall has been repaired? If so, what is the approximate number or

percentage of your members that have taken steps? What steps have they taken?

Response to Question 4.

As noted above, NADA does not advise its members on specific recalls. That is the responsibility of the OEMs who manufactured the vehicles at issue. To your point, however, it was reported that during a May 2015 press conference, the Administrator of NHTSA "encouraged customers to bring their Takata-affected vehicles in for service as soon as they are notified that the parts are available and said that they should continue to drive their vehicles until then." [Emphasis added]¹ Moreover, in response to a written question by Chairman Burgess after an October 21, 2015 hearing entitled "Examining Ways to Improve Vehicle and Roadway Safety," NHTSA Administrator Rosekind answered "no" to the question of whether he believed, "that customers with vehicles equipped with recalled Takata air bags should stop driving those cars."²

America's new-car and -truck dealers fully support efforts to achieve a 100 percent recall completion rate. For fifty years, franchised dealers have been the critical lynchpin to remedy vehicles recalled for a safety defect or noncompliance reasons, Takata airbag-related or otherwise. Enhancing recall campaign effectiveness hinges on improving two key factors: getting necessary parts to dealers as soon as possible and getting owners to bring their recalled vehicles into the dealer to get them fixed.

¹ Audi, "Takata Recall Campaign Communication Toolkit for Dealers," April 14, 2016

² *Examining Ways to Improve Vehicle and Roadway Safety* hearing before the House Commerce, Manufacturing and Trade Subcommittee, 114th Cong., 1st Sess. (2015).

FRED UPTON, MICHIGAN
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
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ONE HUNDRED FOURTEENTH CONGRESS
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Minority (202) 225-3641
October 12, 2016

Dr. John D. Graham
Dean
School of Public and Environmental Affairs
Indiana University
1315 East 10th Street
Bloomington, IN 47405

Dear Dr. Graham,

Thank you for appearing before the Subcommittee on Commerce, Manufacturing, and Trade and the Subcommittee on Energy and Power joint hearing entitled "Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

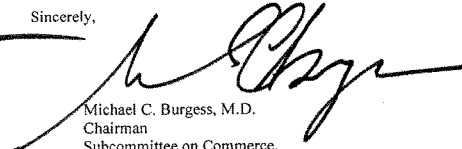
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Thank you again for your time and effort preparing and delivering testimony before the Subcommittees.

Sincerely,



Fred Upton
Chairman



Michael C. Burgess, M.D.
Chairman
Subcommittee on Commerce,
Manufacturing, and Trade

cc: The Honorable Jan Schakowsky, Ranking Member, Subcommittee on Commerce, Manufacturing, and Trade

cc: The Honorable Bobby Rush, Ranking Member, Subcommittee on Energy and Power

Attachment

Additional Questions for the RecordAnswers to questions from The Honorable Michael C. Burgess M.D.

1. **In your opinion, are advances in conventional internal combustion engine technology (i.e., non-hybrid) sufficient by themselves to achieve the current standards for model year 2025? If not, could you please provide your estimates for how much of each of the following technologies (as defined in the TAR) will be required to achieve the current standards for model year 2025: (a) mild hybrid, (b) full hybrid, (c) plug-in hybrid electric vehicle, and (d) electric vehicle.**

Our team has not performed the type of modeling that is required to answer this question in a quantitative way. The National Research Council (2015) report did some relevant modeling for mid-sized cars and determined that the 2025 CAFÉ standards could be met without widespread implementation of full hybrids, diesels or electric vehicles. The Center for Automotive Research (2016) takes a different view, based on their finding that EPA and NHTSA are overestimating the fuel-saving impact of packages of multiple technologies. If multiple technologies do not save as much fuel as the agencies project, then the manufacturers will be forced to make greater use of the more expensive non-ICE technologies. From the automotive supplier community, we have seen conflicting statements in the trade press – some suggesting that full hybrids and plug-ins will not be required and some saying that they will be required by 2025. If implementation of “stop-start” systems is defined as a “mild hybrid”, then our impression is that there is broad consensus that many vehicle manufacturers will use mild hybrid technologies to help comply with the standards. Given that vehicle manufacturers will have to comply with both the federal programs and the California Zero Emission Vehicle program within the same time frame (at least in the ten ZEV states that account for 30% of the new vehicle fleet), and given that California no longer awards ZEV credits for fuel-saving refinements to the ICE or to full hybrids, it is clear that manufacturers will need to make major investments in expensive electrification technologies or hydrogen fuel cell technologies.

2. **According to Table ES- 3 of the TAR, EPA’s compliance pathway for meeting the MY2025 GHG standards envisions that 44% of vehicles would use higher compression ratio, naturally aspirated gasoline engines. If a manufacturer does not have that type of engine in any of its vehicles today, what steps would it have to take in order to integrate that type of engine in its product line, and how long would it take for it to reach a 44% penetration rate?**

Our team does not have the expertise to answer this question. We recommend that you consult with Wally Wade, a retired Ford engineer who is also a distinguished member of the National Academy of Engineering. He was also a member of the 2015 National Research Council committee on fuel-saving technologies.

3. In the TAR, the EPA states that in its modeling, “the California Zero Emission Vehicles (ZEV) program is considered in the reference case fleet; therefore, 3.5% of the fleet is projected to be full EV or PHEV in the 2022-2025 timeframe due to the ZEV program and the adoption of that program by nine additional states.” TAR at ES-10. Since a significant portion of the required GHG reductions will be met through manufacturing electric-drive vehicles for the ZEV mandate, shouldn’t EPA have considered those costs in its assessment of the costs of the regulation? If EPA had considered the costs of producing electric-drive vehicles, what impact would that have had on the cost estimates in the TAR?

Yes, we believe that it would have been more informative – for agency policy makers and for stakeholders, the White House and the Congress – if the TAR had included a complete analysis of the ZEV program as it interacts with the federal programs. After all, California has enacted the ZEV program pursuant to an EPA waiver provided to the California Air Resources Board under the Clean Air Act. While there may be some lawyers in EPA or DOT or CARB who think that the ZEV program should be considered separately from federal CAFÉ and GHG programs, the regulated industry must – in the final analysis – implement a suite of technologies that comply with all three programs in the same time frame. At a minimum, the agencies should have presented one set of analyses that include the ZEV program and one set of analyses that exclude the ZEV program. The overall cost estimates of the three programs would have been larger than the costs of the two programs, since the ZEV program requires vehicle manufacturers to implement costly plug-in vehicles or hydrogen fuel cell vehicles. Regardless of whether the agencies agree to include the additional ZEV analysis in the final TAR, I respectfully recommend that Congress request that comprehensive ZEV-related analyses be conducted by an independent body such as GAO, CBO or the National Research Council.

4. You mentioned that your program received some funding from the automotive industry. What are the terms of your agreement, and do you believe that funding by the automotive industry has influenced the findings of your study?

Our team at IU-SPEA currently has a grant from the Alliance of Automobile Manufacturers to analyze the macroeconomic ramifications of the federal and ZEV programs. Like all grants at IU, the grant is structured in a way that ensures that the IU research team will undertake the study independently and will draw its own conclusions. We are also working with a formal peer review advisory panel to further ensure the objectivity of our findings. Our final report is scheduled for completion at the end of January 2017.

FRED UPTON, MICHIGAN
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

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October 12, 2016

Mr. John German
The International Council
on Clean Transportation
1225 I Street, N.W.
Washington, DC 20005

Dear Mr. German,

Thank you for appearing before the Subcommittee on Commerce, Manufacturing, and Trade and the Subcommittee on Energy and Power joint hearing entitled "Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

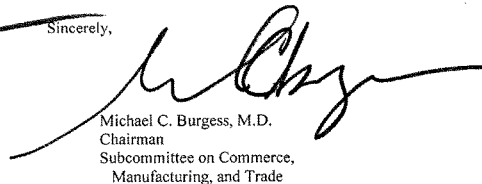
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Thank you again for your time and effort preparing and delivering testimony before the Subcommittees.

Sincerely,



Fred Upton
Chairman



Michael C. Burgess, M.D.
Chairman
Subcommittee on Commerce,
Manufacturing, and Trade

cc: The Honorable Jan Schakowsky, Ranking Member, Subcommittee on Commerce, Manufacturing, and Trade

cc: The Honorable Bobby Rush, Ranking Member, Subcommittee on Energy and Power

Attachment

Additional Questions for the Record**Hearing entitled “Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles”****Subcommittee on Commerce, Manufacturing, and Trade and the
Subcommittee on Energy and Power****Questions submitted to John German, ICCT****The Honorable Michael C. Burgess M.D.**

In your opinion, are advances in conventional internal combustion engine technology (i.e. non-hybrid) sufficient by themselves to achieve the current standards for model year 2025? If not, could you please your estimates for how much of each of the following technologies (as defined in the TAR) will be required to achieve the current standards for model year 2025: (a) mild hybrid; (b) full hybrid; (c) plug-in hybrid electric vehicle; and (d) electric vehicle.

Answer:

Advances in conventional internal combustion engine, transmission, and thermal management technology, combined with reductions in tire rolling resistance, aerodynamic drag, and weight, will be sufficient to achieve the current standards for model year 2025 without the need for full hybrid vehicles.

In the TAR, EPA projected that in 2025 full hybrids would be 3% of the fleet and mild hybrids would be 18%. As I documented in my written comments, even the updated technology estimates in the TAR did not include several important technologies that are already in production or for which production plans have been announced, such as e-boost and variable compression ratio. Further, EPA only included 4% market penetration for Miller cycle engines in 2025 and 7% weight reduction. The market potential in 2025 for Miller cycle is more likely to be about 40% and 15% weight reduction is also feasible by 2025. Thus, the technology estimates in the TAR are conservative and fewer hybrids will be needed than forecasted by the agencies. In particular, no full hybrids will be needed.

Another new technology that has just been introduced into the fleet is 48v hybrid systems. Delphi recently stated that 48v hybrids can get 70% of the benefit of a full hybrid system at 20-30 percent of the cost.¹ 48v hybrid systems will be just as cost-effective as many other technologies available to manufacturers and will be used by manufacturers as needed. The estimate in the TAR for 18% mild hybrids is a reasonable estimate of the penetration of 48v hybrids in 2025.

¹ Automotive News, “DELPHI’S KEVIN CLARK: Supplier sees early payoff from autonomous vehicles, October 3, 2016, www.autonews.com/article/20161003/OEM02/310039994/delphis-kevin-clark%3A-supplier-sees-early-payoff-from-autonomous

The Honorable Michael C. Burgess M.D.

According to Table ES-3 of the TAR, EPA's compliance pathway for meeting the MY2025 GHG standards envisions that 44% of vehicles would use higher compression ratio, naturally aspirated gasoline engines. If a manufacturer does not have that type of engine in any of its vehicles today, what steps would it have to take in order to integrate that type of engine in its product line, and how long would it take for it to reach a 44% penetration rate?

Answer:

It is likely that all manufacturers are already developing higher compression ratio, naturally aspirated engines, at least for evaluation, in response to the major leap in efficiency with Mazda's production of the SkyActiv engine in 2014. But even assuming that a manufacturer did not have higher compression ratio naturally aspirated engines already in development, it would take a maximum of 5 years for a manufacturer to completely develop such a system. This includes 2-3 years for initial development and testing (which most manufacturers have likely already done) and another 2 years or so for a pilot program. After that, the engine could be rolled out into the fleet as part of a manufacturer's normal product redesign cycle, or roughly 20% of its fleet each year. Thus, if desired, any manufacturer could easily meet EPA's projected penetration rate of 44% by 2025.

However, it is important to understand that this is only one of a large number of potential pathways to comply with the standards. EPA and NHTSA make their best estimates of the technologies that manufacturers will put into production, but manufacturers are free to develop the technologies they think will work best for them. Thus, for example, some manufacturers may focus on downsized, turbocharged gasoline engines and eliminate all use of naturally aspirated engines by 2025. Other manufacturers may decide to use a lot more than 44% naturally aspirated engines by 2025, invest in a high penetration of 48v hybrid systems, market a large number of diesel engines, or push the frontier into carbon fiber for 30% weight reductions. Each manufacturer will choose its own path and there are many, many ways to comply.

The Honorable Michael C. Burgess M.D.

In the TAR, the EPA states that in its modeling, “the California Zero Emission Vehicles (ZEV) program is considered in the reference case fleet; therefore, 3.5% of the fleet is projected to be full EV or PHEV in the 2022-2025 timeframe due to the ZEV program and the adoption of that program by nine additional states.” Sine a significant portion of the required GHG reductions will be met through manufacturing electric-drive vehicles for the ZEV mandate, shouldn’t EPA have considered those costs in its assessment of the costs of the regulation? If EPA had considered the costs of producing electric-drive vehicles, what impact would that have on the cost estimates in the TAR?

Answer:

The agencies have appropriately incorporated electric vehicles into their projections for 2025 technology penetration. Relatively few electric vehicles will be necessary to minimally comply with the 2025 federal greenhouse gas emission standards, due to the high availability of low-cost non-electric vehicle technologies. However, the agencies have accurately reflected how the prospects for electric vehicles have improved markedly in just the past several years, and that many companies are deciding to innovate and deploy technology in this area. EPA’s incorporation of industry compliance with the California Air Resources Board’s Zero-Emission Vehicle regulation as part of its reference fleet assessment is entirely appropriate. This is appropriate as it reflects a clear industry trend to, at a minimum, comply with ZEV standards, and it follows the agencies’ precedent of including adopted regulatory compliance in the baseline reference fleet projection. The costs of complying with the ZEV program are appropriately assigned to the ZEV program. Including the costs again in EPA’s GHG standards would double count the costs, which is not appropriate.

FRED UPTON, MICHIGAN
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
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October 12, 2016

Dr. Mark Cooper
Director of Research
Consumer Federation of America
1620 I Street, N.W. Suite 200
Washington, DC 20006

Dear Dr. Cooper,

Thank you for appearing before the Subcommittee on Commerce, Manufacturing, and Trade and the Subcommittee on Energy and Power joint hearing entitled "Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles."

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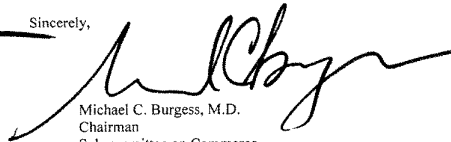
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Thank you again for your time and effort preparing and delivering testimony before the Subcommittees.

Sincerely,



Fred Upton
Chairman



Michael C. Burgess, M.D.
Chairman
Subcommittee on Commerce,
Manufacturing, and Trade

cc: The Honorable Jan Schakowsky, Ranking Member, Subcommittee on Commerce, Manufacturing, and Trade

cc: The Honorable Bobby Rush, Ranking Member, Subcommittee on Energy and Power

Attachment

[Dr. Cooper did not answer submitted questions for the record by the time of printing.]

FRED UPTON, MICHIGAN
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October 12, 2016

Mr. John Bozzella
President and CEO
Global Automakers
1050 K Street, N.W., Suite 650
Washington, DC 20001

Dear Mr. Bozzella,

Thank you for appearing before the Subcommittee on Commerce, Manufacturing, and Trade and the Subcommittee on Energy and Power joint hearing entitled "Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles."

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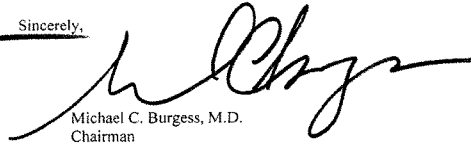
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cc: The Honorable Bobby Rush, Ranking Member, Subcommittee on Energy and Power

Attachment



October 26, 2016

John Bozzella, Global Automakers' President and CEO, offers these responses to Additional Questions for the Record submitted after the House Energy and Commerce Subcommittee on Commerce, Manufacturing and Trade and the Subcommittee on Energy and Power joint September 22, 2016 hearing entitled "Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles."

The Honorable Michael C. Burgess M.D.

- 1. In your opinion, are advances in conventional internal combustion engine technology (i.e., non-hybrid) sufficient by themselves to achieve the current standards for model year 2025? If not, could you please provide your estimates for how much of each of the following technologies (as defined in the TAR) will be required to achieve the current standards for model year 2025: (a) mild hybrid, (b) full hybrid, (c) plug-in hybrid electric vehicle, and (d) electric vehicle.**

Our preliminary analysis of the Technical Assessment Report (TAR) suggests that the agencies' modeling has over-predicted the fuel efficiency benefits of several international combustion engine technologies and, thus, has under-predicted the amount of advanced technology needed to meet the standards for model year 2025. The agencies gathered data from many sources, but it is not clear how they prioritized use of that information. Also, EPA anticipates significant industry reliance on higher compression ratio, naturally aspirated engines to help meet future standards, but the benefits of this technology suggested in the TAR have not yet been substantively validated. Any overly-optimistic predictions about a technology's fuel efficiency will yield an under-prediction of the types and amounts of technology needed to achieve compliance obligations.

Currently, less than three percent of vehicles meet the 2025 model year standards, even though manufacturers have already applied many of the technologies that the agencies predicted would allow them to come into compliance for the 2025 model year. There are no gasoline vehicles that meet the 2025 standards, and the only 2015 model year vehicles that meet the 2025 standards are advanced technology vehicles such as hybrids, plug-in hybrids, fuel cell electric vehicles or battery electric vehicles.

While conventional internal combustion engine technology continues to improve, the industry has expressed concerns with the agencies that conventional technology alone will not be sufficient to meet the 2025 model year standards. Global Automakers believes that more hybrids and electric-drive vehicles will be needed to meet the standards than the agencies have predicted. We are undertaking a more in-depth analysis of the TAR's modeling and results to better approximate the percent of each

different technology that will be needed to meet the current 2025 standards. Once our analysis is complete, we will share it with the agencies and with the House Energy and Commerce Committee.

2. According to Table ES- 3 of the TAR, EPA's compliance pathway for meeting the MY2025 GHG standards envisions that 44% of vehicles would use higher compression ratio, naturally aspirated gasoline engines. If a manufacturer does not have that type of engine in any of its vehicles today, what steps would it have to take in order to integrate that type of engine in its product line, and how long would it take for it to reach a 44% penetration rate?

In planning a new fleet of vehicles, there are several factors that impact the ability and timeframe to roll out technologies, including product planning, technology research and development, safety testing, supply chain logistics, manufacturing tooling, and so forth. It is important to note that the 44% penetration rate of the higher compression ratio, naturally aspirated gasoline engines is a fleet-wide average and will apply differently to each vehicle manufacturer. EPA's technology pathway predicts that some manufacturers' use of higher compression ratio, naturally aspirated gasoline engines will be as high as 70% of their fleets. If this technology is not already in use by such manufacturer, then that is a significant portion of the fleet to change over.

One of the key aspects related to the ability to change technology is associated with product cycles. The 2015 NAS report, *Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles*, looked at motor vehicle product planning as the coordination of three different development cycles: (1) models, which undergo major upgrades every six to eight years, on average, (2) powertrains and transmissions, which are upgraded every 10 to 15 years, and (3) new vehicle platforms, which can remain in use seven to 10 years.¹ Based on these product development constraints, it is unlikely that a given manufacturer will be able to increase their fleet from 0% to 44% higher compression ratio, naturally aspirated gasoline engines in less than ten years.

This is just one technology pathway to meeting the standards, which EPA has determined is the least-cost pathway. Automakers, of course, may choose different pathways for various reasons, including those not necessarily related to costs (e.g., brand identity, competitive strategy, etc.). Based on EPA's assessment, doing so would increase compliance costs even more.

To summarize, EPA's low-compliance-cost fleet projection is predicated on an assumption that the industry will rapidly adopt and incorporate multiple unproven technologies in a short period of time. For a capital-intensive industry like the

¹ National Academies of Science. "Chapter 7: Cost and Manufacturing Considerations for Meeting Fuel Economy Standards." *Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles*. (2015), p. 256. <https://www.nap.edu/read/21744/chapter/9>

automobile industry, this is fundamentally unrealistic. While some of these technologies may succeed in the market, some may not. Others may see a slower pace of customer receptivity and gain market traction over time through gradual, iterative refinements of the technology. EPA's projected TAR costs reflect a "perfect" scenario of lowest cost technology development, rapid technology introduction and broad public receptivity. Should EPA's scenario not bear out in reality, automakers will face higher compliance costs than predicted by the agency.

- 3. In the TAR, the EPA states that in its modeling, "the California Zero Emission Vehicles (ZEV) program is considered in the reference case fleet; therefore, 3.5% of the fleet is projected to be full EV or PHEV in the 2022-2025 timeframe due to the ZEV program and the adoption of that program by nine additional states." TAR at ES-10. Since a significant portion of the required GHG reductions will be met through manufacturing electric-drive vehicles for the ZEV mandate, shouldn't EPA have considered those costs in its assessment of the costs of the regulation? If EPA had considered the costs of producing electric-drive vehicles, what impact would that have had on the cost estimates in the TAR?**

You are correct. In its regulatory account of costs and benefits, EPA included the benefits of ZEVs but did not account for the costs of the ZEV mandate; NHTSA has not considered the impact of the mandate at all. The ZEV mandate requires a growing percentage of vehicles to be ZEVs by 2025, estimated in 2012 to be approximately four million ZEVs sold in California and the nine other states that have adopted California's ZEV mandate. Since these ten states require ZEVs, these vehicles will be factored in as part of a manufacturers' national fleet for GHG compliance purposes. Thus, both the volume of ZEVs and associated technology costs should be assessed as part of the GHG compliance pathway.

If EPA were to consider the cost impact of the ZEV mandate, the TAR's estimated cost of compliance would increase because electric-drive technologies cost substantially more than other technologies on a per-ton of CO₂ reduced basis. EPA projects that the increase in the average per-vehicle costs of meeting the MY 2022-2025 standards are \$894 - \$1,017. Our preliminary analysis shows that the average vehicle price would increase by \$356 on top of the EPA estimate (or an additional 35-40%) when accounting for electric-drive vehicles that are required by the ZEV mandate. This has a significant impact on Americans' monthly budgets, as the overall cost of the average vehicle is already more than half of the 2015 median income of \$56,500.²

These higher costs could lower consumer demand, especially given the concerns that customers have about the convenience and the perceived durability and reliability of vehicles

² http://www.nytimes.com/2016/09/14/business/economy/us-census-household-income-poverty-wealth-2015.html?_r=0.

that use electric-drive technologies. By way of comparison, conventional hybrid vehicles have been in the market for over 15 years. While conventional hybrids do not share some of the customer acceptance challenges facing most electric-drive vehicles (such as the need for available electric charging), hybrid vehicle sales are still sensitive to consumer preferences and market changes, as evidenced by the drop in hybrid sales nationally from three percent in 2013 to less than two percent in 2016.³

4. Mr. German mentioned a study prepared by Novation Analytics at the behest of your trade associations and implied that it was backwards looking and didn't account for future technologies. Is this true, and if not, why not?

The Novation Analytics study referenced by Mr. German is an analysis of the 2012 final rule in which Novation Analytics, through a detailed assessment of the EPA's and NHTSA's modeling processes, provides valuable plausibility checks and other information that could be utilized by the agencies to improve their modeling efforts during the midterm evaluation process. (At the time Novation Analytics conducted its analysis, the agencies TAR modeling assumptions and inputs were not yet available). Among the study's findings is an identification of overly optimistic agency efficiency projections for certain technologies.

While the Novation Analytics work does not directly include forecasts of new technologies not currently in the market, it does consider improvements to the powertrain overall, including application of new hardware and incorporation of learning, *i.e.* that manufacturers will shift to "best-in-class" fuel efficiency over time.

Moreover, the Novation Analytics study does not exclude the benefits delivered by mass reductions and other load reductions. In fact, the work assumes that the agencies' estimates for future fuel efficiency improvements associated with mass reduction, aerodynamics and tires are met. These values are accepted and removed from the analysis to allow for a powertrain-focused assessment.

Novation Analytics' work does not suggest that the standards cannot be met. Rather its findings support that, in contrast to agency assertions, additional technology, with additional associated costs, will be needed to meet upcoming compliance obligations. These findings were presented to EPA, NHTSA and CARB in the months leading up to the TAR release.

Based on a preliminary analysis of the TAR's modeling, we believe a number of the same modeling concerns found in the 2012 final rule still exist, which underscores our concern that additional technologies and cost will therefore be needed to achieve the model year

³ IHS Global New Vehicle Registration Data, 2013 and January-June 2016.

2025 standards.

5. If the assumptions in the TAR prove wrong, what, if anything, can we do to mitigate the damage to consumers and industry?

Congress plays an important role in the oversight of the agencies and regulations to ensure that regulatory actions are transparent, scientifically sound, data-driven and robust. Through oversight, Congress can review the agencies' methodologies and recommend that they consider the most up-to-date data in the midterm evaluation. Congress can also highlight the critical role of all Americans in meeting the GHG and CAFE regulations. Consumer acceptance of new technologies and vehicle affordability must be considered by the regulators.

Further, there is space for legislative action by Congress to further harmonize the EPA, NHTSA and California programs to better achieve one national program. For example, it may be possible for Congress to take legislative action to change the current statutory requirements that each of the federal agencies must follow. By aligning these statutory guides further, we can reduce drag in the system and better encourage innovations to reduce emissions and improve fuel economy.

